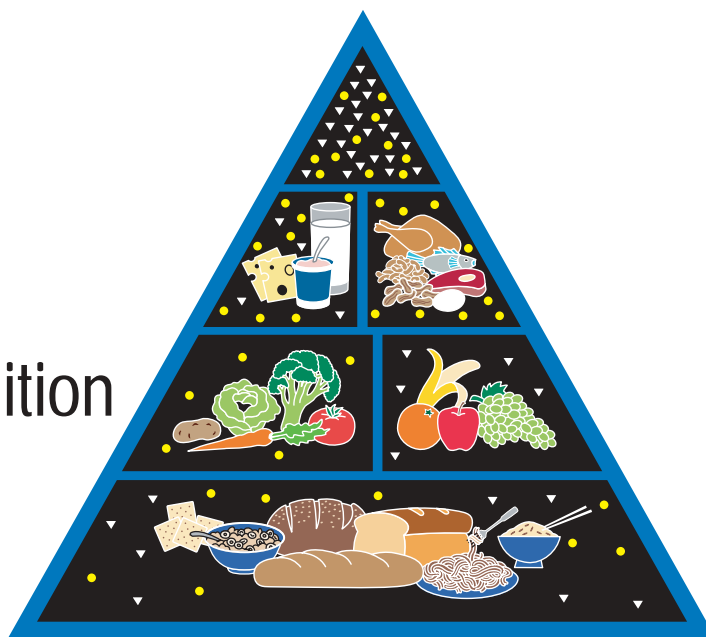




2003 Missouri Diet Manual

9th Edition



Nutritional Health and Services
Missouri Department of Health and Senior Services

INTRODUCTION

The *Missouri Diet Manual* was first printed in 1958 and is in its ninth revision. The purpose of the manual is to provide clear-cut practical information and guidelines in diet therapy for normal nutrition and modified diets. This manual has been prepared primarily for use by food and nutrition service personnel in Missouri hospitals and nursing homes. It is hoped that this manual will be beneficial as a guide to physicians in prescribing appropriate nutrition interventions in these institutions.

This manual places emphasis upon providing adequate nutrition to all patients or clients. Normal nutrition and modified dietary guidelines were planned to meet the current Recommended Dietary Allowances by the Food and Nutrition Board of the National Research Council, unless the dietary modification makes it impossible.

To be effective Medical Nutrition Therapy must be individualized for each person. The suggested guidelines in this manual are guidelines, and/or examples that may require adaptation to specific situations and to individual requirements and preferences.

The ninth edition of the *Missouri Diet Manual* maintains the original purpose of previous editions in planning normal nutrition and modified nutritional therapies so they will be simple and as practical as possible, while describing medical nutrition therapies in terms of current nutritional principles that reflect the knowledge of new findings in the field of nutrition.

Dietary recommendations for PKU were added in this edition, and Dietary Reference Intakes and Dietary Guidelines for Americans were added to the Appendix. Sections and sub-sections that were extensively revised include Vegetarian Nutrition, Modifications in Calories, Modifications for Renal Disease, Modifications in Fat, Nutrition Support, Nutrition in HIV/AIDS, and Food, Nutrient and Drug Interactions. The remaining sections and sub-sections were either not updated or received minimal revisions.

Acknowledgement for the revision of this ninth edition of the Missouri Diet Manual goes to the following:

Eugenia Althen, M.H.S., R.D., L.D., Berger, MO
Jennifer Anderson, R.D., L.D., C.D.E., Columbia, MO
Jeanne Bridges, R.D., L.D., St. Joseph, MO
Anita Cain, M.A., R.D., L.D., Jefferson City, MO
Margaret (Peggy) Connelly, M.A., R.D., St. Louis, MO
Mary Cutts, M.S., R.D., L.D., C.N.S.D., Columbia, MO
Karen Derrick, M.A., R.D., L.D., C.D.E., Columbia, MO
Julie Grasela, R.D., Columbia, MO
Maureen Green, R.D., C.D.E., Columbia, MO
Beth Heine, M.S., R.D., St. Louis, MO
Leslie Hornick, R.D., L.D., Fulton, MO
Debra Murphy, R.D., St. Louis, MO
Tricia Nilges, R.D., L.D., Fulton, MO
Julie Noel, R.D., St. Louis, MO
Annie Nelson, M.S.A., R.D., L.D., Kansas City, MO
John Newsom, R.D., Jefferson City, MO
Jill Newton, M.P.H., R.D., C.D.E., Columbia, MO
Jennifer Polniak, M.S., R.D., L.D., C.D.E., Columbia, MO
Rita Reeder, M.S., R.D., L.D., Jefferson City, MO
Laura Roling, R.D., L.D., Kansas City, MO
Ann Terry, M.S., R.D., L.D., Jefferson City, MO
Nancy Yeunger, R.D., L.D., St. Louis, MO
Rosalind M. Wilkins, M.S., R.D., L.D., Jefferson City, MO

TABLE OF CONTENTS

INTRODUCTION

NORMAL NUTRITION

General Nutrition – 1.1
Basic Food Guide – 1.2
USDA Food Guide Pyramid – 1.7
Nutrition for Older Adults – 1.9
Nutrition for Pregnancy and Lactation – 1.15
Nutrition for the Infant – 1.20
Nutrition for Toddlers and Children – 1.23
Nutrition for Adolescents and Young Adults – 1.28
Vegetarian Diet – 1.31

MODIFICATIONS IN CONSISTENCY

Clear Liquid Diet – 2.1
Full Liquid Diet – 2.3
Dysphagia Diet – 2.5
Descriptions of Food Consistencies – 2.9
Pureed Diet – 2.11
Modified Pureed Diet – 2.15
Dental Soft Diet – 2.19
Mechanical Diet – 2.23

MODIFICATIONS FOR GASTROINTESTINAL DISORDERS

The Bland Diet – 3.1
Esophageal Reflux – 3.2
Postgastrectomy Diet – 3.4
Low Fiber/Low Residue Diet – 3.7
Increased Fiber Diet – 3.10
Nutritional Management for Ostomy Placement – 3.13
Gluten - Restricted Gliadin-Free Diet – 3.16
Restricted Lactose Diet – 3.23

MODIFICATIONS IN CALORIES

Diabetes Mellitus – 4.1
Nutrient and Food Source Guidelines – 4.5
Nutrition Assessment – 4.9
Diabetes Self Management Training Guidelines – 4.9
Food Planning Methods – 4.13
Special Considerations – 4.16
Monitoring – 4.22
Reactive Hypoglycemia – 4.29
Weight Management – 4.33

MODIFICATIONS FOR RENAL DISEASE

Nutritional Management of Renal Disease – 5.1
Daily Nutrient Recommendations for Renal Disease – 5.3
National Renal Diet Food Choice Values – 5.5
Renal Exchange List – 5.7
Calculation Sheet – 5.17

**MODIFICATIONS
IN
FAT**

High LDL Cholesterol/Dyslipidemia – 6.1
Therapeutic Lifestyle Change (TLC) Diet – 6.4
TLC/Low Cholesterol, Low Saturated Fat Diet – 6.8
Specific Dyslipidemias – 6.14
Fatty Acid and Cholesterol Content of Some
Commonly Used Foods – 6.19

**MODIFICATIONS
IN
SODIUM**

Restricted Sodium Diets – 7.1
Sodium Modifications for the American Heart
Association Diet – 7.3
4000 Milligrams (174 Milliequivalents) – 7.4
3000 Milligrams (130 Milliequivalents) – 7.6
2000 Milligrams (87 Milliequivalents) – 7.9
1000 Milligrams (44 Milliequivalents) – 7.12
Use of Sodium Points for Sodium Restricted Diets – 7.16
Sodium Exchanges – 7.17
Sodium Points of Foods – 7.18

**NUTRITION
SUPPORT**

Enteral Nutrition – 8.1
Parenteral Nutrition – 8.11
Peripheral Protein Sparing – 8.11
Total Parenteral Nutrition – 8.12
Increased Calorie and Increased Protein Diet – 8.16

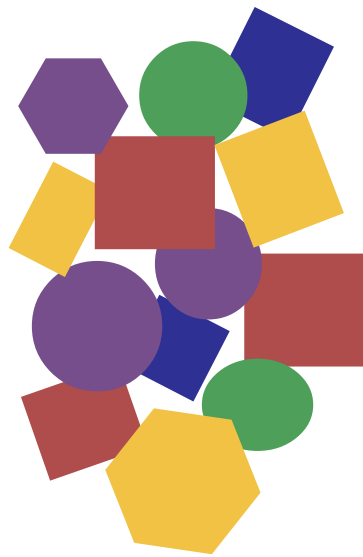
**NUTRITION
FOR SPECIAL
NEEDS**

Nutrition in HIV/AIDS – 9.1
Tyramine Restricted Diet – 9.8
Mild Purine Restricted Diet – 9.12
Test Diets – 9.16
Diet for PKU – 9.18

APPENDIX

Food, Nutrient, and Drug Interactions – 10.1
Caffeine Content of Beverages – 10.3
Significant Sources of Calcium – 10.4
Average Cholesterol Content of Foods – 10.6
Folate Rich Foods – 10.8
Foods High in Iron – 10.9
Measure Conversion Chart – 10.11
Approximating Ideal Body Weight for Adults – 10.12
Harris - Benedict Equation – 10.13
Equations for Predicting Resting Energy Expenditure
from Body Weight – 10.14
Approximate Energy Expenditure for Various Activities In
Relation to Resting Needs for Males and Females of
Average Size – 10.15
Example of Calculation of Estimated Daily Energy Allowances
for Exceptionally Active and Inactive 23 Year Old
Adults – 10.15
Factors for Estimating Daily Energy Allowances at Various
Levels of Physical Activity for Men and Women
(Ages 19-50) – 10.16
Median Heights and Weights and Recommended Energy
Intake – 10.17

- Adjustment of Desirable Body Weight for Amputations – 10.18
- 1959 Metropolitan Height and Weight Tables for Adults – 10.19
- 1983 Metropolitan Height and Weight Tables for Adults – 10.20
- Average Height-Weight Table for Persons 65 Years and Older – 10.21
- Body Mass Index – 10.22
- Weights for Height of Adults in the United States – 10.23
- Weights and Heights of Males and Females Up to 18 Years in the United States – 10.23
- Growth Charts
 - Birth to 36 Months: Boys Length-for-Age and Weight-for-Age – 10.25
 - Birth to 36 Months: Boys Head Circumference-for-Age and Weight-for-Length Percentiles – 10.26
 - Birth to 36 Months: Girls Length for Age-and-Weight-for-Age – 10.27
 - Birth to 36 Months: Girls Head Circumference-for-Age and Weight-for-Length Percentiles – 10.28
 - 2 to 20: Boys Stature-for-Age and Weight-for-Age Percentiles – 10.29
 - 2 to 20: Boys Body Mass Index-for-Age Percentiles – 10.30
 - 2 to 20: Girls Stature-for-Age and Weight-for-Age Percentiles – 10.31
 - 2 to 20: Girls Body Mass Index-for-Age Percentiles – 10.32
 - Weight for Stature Percentiles: Boys – 10.33
 - Weight for Stature Percentiles: Girls – 10.34
- Failure to Thrive Infants and Toddlers – 10.35
- Fluid/Fluid Needs – 10.36
- Estimated Safe and Adequate Daily Dietary Intakes of Vitamins and Minerals. – 10.37
- Recommended Dietary Allowances – 10.38
- Dietary Reference Intakes – 10.41
- Dietary Guidelines for Americans – 10.63



Normal Nutrition

GENERAL NUTRITION

PURPOSE

The purpose of this diet is to attain or maintain optimal nutritional status in persons who do not require specific dietary modifications. The requirement for a specific nutrient varies depending on activity level, weight, sex, age, and height.

NUTRITIONAL ADEQUACY

This diet is adequate in all nutrients according to the current Recommended Daily Allowances (RDAs), provided individuals make wise choices in selecting foods and adhere to established dietary recommendations.

INDICATIONS FOR USE

This diet meets the Recommended Daily Allowances when it includes appropriate types and amounts of suggested food choices. It is used to promote health and reduce the risk for the development of major, chronic nutrition-related diseases. No one-food group is more important than another, they are all equally important. While it is not necessary to eliminate foods from the diet, and there are no “good or bad” foods, it should be remembered that high fat and sugar foods should be consumed infrequently or in small amounts.

GUIDELINES FOR DIET PLANNING

Since World War II, national and international food and nutrition policies have been based on the Recommended Dietary Allowances. Within the past decade, the United States Department of Agriculture (USDA), the U.S. Department of Health and Human Services, the American Medical Association, the American Institute of Cancer Research, and governments of other countries have developed guidelines in which moderation, variety, and balance are the focus. Even though the data was gathered and published by various organizations, the majority of the information was very similar and contained only minor differences. They all considered the relationship between diet, health, and the reduction of chronic disease risk.

In 1990, the USDA replaced the Basic Four Food Groups with the Food Guide Pyramid, and it best represents healthy eating. The intent of the Pyramid was to provide a general food guide of what to eat each day in order to get a well-rounded intake of nutrients and calories needed to maintain health. However, there are a few concerns with the Pyramid. One of those concerns has to do with dried beans being located in the meat group toward the top of the Pyramid. According to literature, foods toward the top of the Pyramid are to be used less often than foods at the lower end of the Pyramid because of higher fat content. Dried beans have very little naturally occurring fat. The same comment is made of skim milk and products made from skim milk.

The key shows fat as “naturally occurring and added” and sugar as “added”. The vegetable group has only “naturally occurring” fat, no added fat, and there is no vegetable listed that has any other than a trace amount of naturally occurring fat. The fruit group contains many fruits that have “naturally occurring” sugars, but shows only “added” sugars. Overall, the Food Guide Pyramid remains to be an excellent guide for healthier eating.

In 1980, the first dietary guidelines for Americans were published by the Public Health Service of the Department of Health and Human Services and the U.S. Department of Agriculture. The report was revised in 1985, 1995, and again in 2000 to include ten guidelines for Americans to follow that promote health and reduce risk for chronic disease. (See Appendix Dietary Guidelines for Americans, 2000)

BASIC FOOD GUIDE

The food groups provide a pattern to use as a guide when planning menus. The minimum number of servings specified from each group, if well chosen, forms the foundation of a nutritionally adequate diet. Use of additional servings from these groups along with the “other” foods may be needed if caloric need is greater.

Meat, Poultry, Fish, Dried Beans, Eggs, and Nuts Group

The meat group includes meat (beef, veal, pork, lamb, and wild game), fish and shellfish, poultry, eggs, legumes (dry beans, lentils) and nuts.

A serving from this group equals:

- 2-3 oz. meat, fish, or poultry
- 1/2 cup canned tuna or salmon
- 2-3 oz. of liver
- 2 hot dogs, 1 3/5 oz. each
- 2-3 slices luncheon meats, 1 oz. slices

Foods which count as one ounce of meat, poultry or fish:

- 1 egg,
- 2 Tbsp peanut butter,
- 1/3 cup nuts
- 1/2 cup cooked dried beans, peas and lentils.

Meat, fish, poultry and eggs provide high quality protein. Dry beans and peas, soy extenders, and nuts by themselves are incomplete proteins (amino acids). Foods containing dry beans, dry peas or nuts should be combined with grain or animal protein to enhance protein utilization (examples: bean burrito with cheese or peanut butter sandwich).

Milk, Yogurt, and Cheese Group

The milk group contains all types of milk used as beverages, all kinds of natural or processed cheese, cottage cheese, yogurt, ice cream, and foods made with large proportions of milk such as cream soups and puddings.

The recommended servings of milk vary for different groups of people, because nutrient needs vary with body size and the stage of growth.

A serving from this group equals:

- 1 cup or 8 ounces whole, 2%, or skim milk, buttermilk; reconstituted nonfat dry or reconstituted
- 1 1/2 ounces cheese
- 2 ounces cheese spread
- 1/4 cup cottage cheese
- 1 cup cream soup made with milk
- 1/2 cup ice cream
- 1/2 cup pudding or custard made with milk
- 3/4 cup yogurt, plain nonfat

Milk is the best source of calcium and riboflavin, and it is an important source of vitamins A and D and high quality protein. Milk provides carbohydrate, fat (unless nonfat is used), and other nutrients.

Bread, Cereal, Rice, and Pasta Group

The bread and cereal group includes all grains – such as barley, buckwheat, corn, oats, rice, rye and wheat – and bread, breakfast cereals, grits, noodles, and pasta products made from grains.

Each of the following is equal to one serving from the bread and cereal group:

- 1 slice of whole-wheat or enriched bread
- 1 pancake or small waffle
- 1 tortilla
- 1/2 english muffin or hamburger bun
- 3/4 cup ready-to-eat cereal
- 1/2 cup cooked cereal, rice, grits, pasta, or noodles
- 1 roll, muffin, or biscuit
- 6 saltines
- 3 graham crackers
- 1 piece (2" square) cornbread

Labels should be checked carefully to assure that the products are enriched, fortified, or whole-grain. Enriched grains provide iron, thiamin, riboflavin and niacin, and are the main source of carbohydrate. Whole-grain foods, such as whole-wheat bread, oatmeal, and shredded wheat, provide more fiber, zinc, folic acid, and Vitamins B6 and E than other bread and cereals. Milk combined with grains improves the usability of grain proteins for body repair and building. (Examples: cereal with milk, cheese and rice casserole)

Fruit Group

The fruit group includes all fresh, frozen, and dried fruits. A daily source of vitamin C rich foods needs to be included in the diet. A rich source of vitamin A is needed at least 3 to 4 times per week.

A serving of cooked fruits is equivalent to 1/2 cup or a portion ordinarily served, such as a medium apple or banana, or half of a medium grapefruit.

Fruit Group

Serving and Food

Vitamin C Source

Citrus Fruits -

- 3/4 cup orange or grapefruit juice
- 1/2 grapefruit
- 1 medium orange
- 2 small tangerines

Other Fruits -

- 1/4 cantaloupe
- 1/2 cup strawberries
- 3/4 cup fruit juice enriched with vitamin C

Vitamin A Sources

- 1/2 cup apricots, cantaloupe, mango

Vegetable Group

The vegetable group includes all fresh and frozen vegetables except dried beans and dried peas. A daily source of folic acid rich foods needs to be included in the diet. A rich source of vitamin A is needed at least 3 to 4 times per week.

A serving of cooked vegetables is equivalent to 1/2 cup or a portion ordinarily served, such as a small potato.

Vegetable Group

Serving and Food

Vegetables

1/2 cup of broccoli
1/2 cup of cabbage
1/2 cup cauliflower
1 medium tomatoes
1/2 cup brussels sprouts
1/2 cup cooked green beans, potatoes, beets, etc.

Folic Acid Sources

1 cup raw or 1/2 cup cooked broccoli;
asparagus; brussels sprouts; spinach,
beets, mustard, or turnip greens; dark
leafy lettuce

Vitamin A Sources

1/2 cup servings of carrots, pumpkin,
sweet potatoes, tomatoes, winter
squash, greens

Fats, Oils, and Sweets

Fats are a concentrated source of energy, contain essential fatty acids, and serve as carriers for fat-soluble vitamins.

This group contains foods that have a low nutrient density (a low level of nutrients and a high calorie content).

Foods included in this group are sweets or desserts that are high in fat and sugar and are often made with flour that is not enriched. Salty items, such as potato chips and salt pork, are included in this group. These foods can compliment, but do not replace, foods from the food groups. Amounts or servings should be determined by individual calorie needs.

A serving equals:

1 tsp. margarine, butter, or oil
1 Tbsp. salad dressing or cream cheese
1 Tbsp. sour cream or heavy cream
1 tsp. mayonnaise
1 slice bacon
1 Tbsp. gravy

Beverages and Fluids

This group supplies no significant nutrients, but it does supply water. Coffee, tea, and sugar-free carbonated beverages are contained in this group. Carbonated and alcoholic beverages provide carbohydrate and alcohol, and may contribute to significant calories.

Miscellaneous

Items contained in this group include condiments and sweets, which are used in small amounts.

Condiments for flavoring substances, such as catsup and mustard, may contribute some nutrients but are usually eaten in amounts too small to be significant. Sugar, honey, syrup, jam, and jelly contain little or no additional nutrients other than carbohydrates.

Vitamins and Minerals

Vitamins and minerals serve many functions. Vitamins are a group of organic compounds in foods that are needed in minute quantities, and are essential for specific body functions of maintenance, growth and reproduction. Vitamins are classified as either fat-soluble or water-soluble. Minerals are subdivided into two categories: 1) macro-nutrients – those occurring in appreciable amounts accounting for most of the body content of minerals such as calcium and, 2) micro-nutrients or trace elements – those present in minute quantities, such as iodine or iron. Mineral elements are components of the body's structure or constituents of enzymes and hormones. They serve as regulators of body fluids and are involved with other body functions.

Fiber

A normal, healthy diet should contain 20-35 grams of dietary fiber. Dietary fiber is generally defined as the sum of the digestible carbohydrate and carbohydrate-like components of food including cellulose, lignin, hemicelluloses, gums, and pectins. These non-digestible substances provide bulk in the diet and aid elimination.

Water

Water is an essential part of the diet for it plays a role in practically all body processes, and is the most abundant body constituent. The body is equipped with a number of homeostatic mechanisms, including the sensation of thirst, that operate to maintain total body water within narrow limits. Water is present in practically all foods.

Food groupings have been made and general guidelines established that recommend the appropriate number of servings from each of the food groups, so that an adequate amount of minerals and vitamins are provided in the daily diet. The elimination of one food group might appreciably reduce the intake of one or more of the minerals and vitamins.

The manner in which foods are selected, prepared, and served affects their contribution to the diet. Care must be taken to select a variety of foods, to prepare them in a manner that preserves their nutrient content and prevent food spoilage or contamination, and to serve them attractively.

SAMPLE MEAL PLAN FOR GENERAL NUTRITION

BREAKFAST	LUNCH	DINNER
Orange Juice, 3/4 cup	Vegetable Soup, 1 cup	Baked Chicken, 3 oz.
Whole Grain Cereal, 3/4 cup	Whole Wheat Bread, 2 slices	Baked Potato, 1 small
Fruit, 1/2 cup	Roast Beef, 2-3 oz.	Green Beans, 1/2 cup
Whole Wheat Toast, 2 slices	Tossed Salad, 1 cup	Whole-Grain Roll, 1
Egg, 1	Italian Dressing, 1 Tbsp.	Peaches, canned, 1/2 cup
Bacon, 1 slice	Apple, 1 medium	Margarine, 1 tsp.
2% Milk, 8 oz.	Graham Crackers, 3	Angel Food Cake, 1/12 slice
Margarine, 1 tsp.	Mayonnaise, 1 tsp.	2% Milk
Jelly, 1 Tbsp.	Mustard	Coffee/Tea
Sugar, 1 tsp.	Catsup	
Coffee/Tea	Coffee/Tea	

The plan can be individualized to meet nutritional needs.

The diet as listed in the sample Meal Plan contains approximately: (% - Percent of Total Calories.)

Calories	2285
Protein	109 grams (19%)
Carbohydrate	333 grams (26%)
Total Fat	65 grams (55%)

REFERENCES

1. U.S. Department of Agriculture, U.S. Department of Health and Human Services, *Nutrition & Your Health: Dietary Guidelines for Americans*, 3rd Edition, Washington, D.C.: U.S. Government Printing Office, 1990. Home and Garden Bulletin No. 232.
2. U.S. Department of Agriculture, U.S. Department of Health and Human Services, *Making Healthy Food Choices*, 1st Edition, Washington, D.C.: U.S. Government Printing Office; February 1993. Home and Garden Bulletin No. 250.
3. Mahan, L. Kathleen and Arlin, Marian, *Krause's Food Nutrition and Diet Therapy*, 8th Edition, Philadelphia, W. B. Saunders Company, 1992, pp 284-285.
4. Peckenpaugh, Nancy J. and Poleman, Charlotte M.; *Nutrition Essential and Diet Therapy*, 8th Edition, Philadelphia, W. B. Saunders Company, 1995, pp 131-142.
5. U.S. Department of Agriculture, Human Nutrition Information Service, August 1992, Leaflet No. 572.
6. U.S. Department of Agriculture, U.S. Department of Health and Human Services, December 1995, 4th Edition, 1995. *Home and Garden Bulletin No. 232*.
7. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.

Food Guide Pyramid

A Guide to Daily Food Choices

Fats, Oils, & Sweets
USE SPARINGLY

KEY

- Fat (naturally occurring and added)
- Sugars (added)

These symbols show that fat and added sugars come mostly from fats, oils, and sweets, but can be part of or added to foods from the other food groups as well.

Milk, Yogurt, & Cheese Group
2-3 SERVINGS

Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts Group
2-3 SERVINGS

Vegetable Group
3-5 SERVINGS

Fruit Group
2-4 SERVINGS

Bread, Cereal, Rice, & Pasta Group
6-11 SERVINGS

SOURCE: U.S. Department of Agriculture/U.S. Department of Health and Human Services

Use the Food Guide Pyramid to help you eat better every day. . .the Dietary Guidelines way. Start with plenty of Breads, Cereals, Rice, and Pasta; Vegetables; and Fruits. Add two to three servings from the Milk group and two to three servings from the Meat group.

Each of these food groups provides some, but not all, of the nutrients you need. No one food group is more important than another — for good health you need them all. Go easy on fats, oils, and sweets, the foods in the small tip of the Pyramid.

To order a copy of "The Food Guide Pyramid" booklet, send a \$1.00 check or money order made out to the Superintendent of Documents to: Consumer Information Center, Department 159-Y, Pueblo, Colorado 81009.

U.S. Department of Agriculture, Human Nutrition Information Service, August 1992, Leaflet No. 572

How to Use The Daily Food Guide

What counts as one serving?

Breads, Cereals, Rice, and Pasta

1 slice of bread
1/2 cup of cooked rice or pasta
1/2 cup of cooked cereal
1 ounce of ready-to-eat cereal

Vegetables

1/2 cup of chopped raw or cooked vegetables
1 cup of leafy raw vegetables

Fruits

1 piece of fruit or melon wedge
3/4 cup of juice
1/2 cup of canned fruit
1/4 cup of dried fruit

Milk, Yogurt, and Cheese

1 cup of milk or yogurt
1-1/2 to 2 ounces of cheese

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts

2-1/2 to 3 ounces of cooked lean meat, poultry, or fish
Count 1/2 cup of cooked beans, or 1 egg, or 2 tablespoons of peanut butter as 1 ounce of lean meat (about 1/3 serving)

Fats, Oils, and Sweets

LIMIT CALORIES FROM THESE especially if you need to lose weight

The amount you eat may be more than one serving. For example, a dinner portion of spaghetti would count as two or three servings of pasta.

How many servings do you need each day?

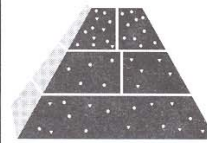
	Women & some older adults	Children, teen girls, active women, most men	Teen boys & active men
Calorie level*	about 1,600	about 2,200	about 2,800
Bread group	6	9	11
Vegetable group	3	4	5
Fruit group	2	3	4
Milk group	**2-3	**2-3	**2-3
Meat group	2, for a total of 5 ounces	2, for a total of 6 ounces	3 for a total of 7 ounces

*These are the calorie levels if you choose lowfat, lean foods from the 5 major food groups and use foods from the fats, oils, and sweets group sparingly.

**Women who are pregnant or breastfeeding, teenagers, and young adults to age 24 need 3 servings.

A Closer Look at Fat and Added Sugars

The small tip of the Pyramid shows fats, oils, and sweets. These are foods such as salad dressings, cream, butter, margarine, sugars, soft drinks, candies, and sweet desserts. Alcoholic beverages are also part of this group. These foods provide calories but few vitamins and minerals. Most people should go easy on foods from this group.



Some fat or sugar symbols are shown in the other food groups. That's to remind you that some foods in these groups can also be high in fat and added sugars, such as cheese or ice cream from the milk group, or french fries from the vegetable group. When choosing foods for a healthful diet, consider the fat and added sugars in your choices from all the food groups, not just fats, oils, and sweets from the Pyramid tip.

NUTRITION FOR OLDER ADULTS

PURPOSE

The purpose of this diet is to provide a nutritionally adequate diet for persons 51 years and older who do not require dietary restrictions for special diseases.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances (RDAs) when it includes appropriate types and amounts of suggested food choices from the Food Guide Pyramid and the Dietary Guidelines. This should be the basis for meal planning.

INDICATION FOR USE

The diet is used for persons 51 years and older who do not require dietary restrictions for special diseases.

DIET PRINCIPLES

The best criterion to be used in planning diets for the older adult is attainment of nutritional requirements based on the Recommended Dietary Allowances. The diet should be planned to include at least the minimum number of servings from the basic food groups and/or food Pyramid. Religious preferences and ethnic groups should be considered when making selections for the older adult. Factors such as general health, nutritional stresses of any disease present, the amount of physical activity, and other factors may influence dietary requirements. The functional capacity of nearly every organ system decreases with age. However, it is not clear as to how such changes may influence nutritional needs. Psychiatric disorders such as depression and loneliness, altered taste or appetite from use of drugs, difficulties with chewing, less money and difficulties in preparing food for a person living alone may interfere with the older adult obtaining an adequate diet.

NUTRITIONAL NEEDS

Presently, it is assumed that the RDA for persons over 51 years old is the same as those for younger persons except in the instance of energy. A wide range of caloric requirements takes into consideration the range of activity for various individuals to prevent weight gain or obesity.

Energy

Energy requirements decrease with age. In addition to a decline in metabolism, a decrease of physical activity lowers the energy needs even further. The Estimated Energy Requirement (EER) is defined as the dietary energy intake that is predicted to maintain energy balance in a healthy adult of a defined age, gender, weight, height and physical activity. There is no Recommended Dietary Allowance for energy because energy intakes above the EER would be expected to result in weight gain.

Minerals

Calcium is the mineral that will most likely be inadequate. The absorption of calcium decreases with age and osteoporosis is commonly seen in the elderly, but it is apparently the result of many years of several factors, one of which may be poor calcium intake. The RDA for calcium is 1200 mg/day to minimize bone loss, which is an increase from 800 mg/day in the 1989 RDAs.

When it is not practical to increase the calcium intake through food alone, a calcium supplement should be recommended. From the various products on the market, calcium carbonate is about 40 percent calcium; thus, a 1000 mg tablet will yield 400 mg calcium. For persons with osteoporosis, it is important for the individual to engage in weight-bearing exercise in addition to increased calcium intake.

For every 1000-calorie well-balanced diet, 6 mg iron is provided, therefore, it is essential to consume 1650-1700 calories per day in order to take in the recommended 10 mg iron/day. If calorie needs are lower, individuals must choose foods that are especially rich in iron or may be advised to take an iron supplement. Nutrition-related iron deficiency anemia is not common in the elderly. Anemia in this age population is generally related to blood loss, often from the gastrointestinal tract, and requires medical attention.

Intakes of zinc in the elderly decline in relation to the decrease in energy intake and are much lower than the recommended level of 15 mg per day for men and 12 mg per day for women. Zinc deficiency is associated with impaired immune function, anorexia, dysgeusia, delayed wound healing, and decubitus ulcers.

Hypertension is common in the elderly, and recommendations for mineral intake include reducing sodium to 2 – 3 gm per day and supplementing the diet with magnesium and potassium for those taking diuretics.

Protein

Protein requirements for the elderly have not been proven to be different from those of younger adults. However, because the elderly are more frequently ill and illness commonly causes significant loss of protein from the body, diets planned for the elderly should contain a greater amount of protein than for the younger adult. A protein deficiency is unlikely in the American elderly population who do not have a debilitating disease. Protein-calorie malnutrition is more frequent in elderly men who live alone. Such deficiencies contribute to edema, itching of the skin, chronic eczema, fatigue, muscle weakness, and tissue wastage. Wounds heal slowly, and body immune response may be impaired.

Vitamins

Many elderly persons' diets do not meet the RDAs for vitamins A, C, B6, and folate. However, there is rarely ever physical or biochemical evidence of vitamin deficiencies. Because it is costly and difficult to determine when and individual is at risk, it is wise to consume a diet that meets the RDAs.

Reduced gastric acidity adversely affects the absorption of iron and vitamin B12. Anemia due to folic acid deficiency may occur in conjunction with vitamin C deficiencies when fresh fruit and vegetables are low or omitted from the diet.

Some elderly people are at risk for vitamin D deficiency if they do not drink milk and if they have very little exposure of the skin to sunlight.

Fiber

Many older adults omit fiber-rich foods from their diets because they believe these foods are irritating to the gastrointestinal tract. The older adult must be encouraged to gradually increase the amounts of vegetables, fruits, whole-grain foods, legumes, and nuts to their diet since a sudden increase can lead to bloating, gas, and diarrhea.

Fluid

Liberal amounts of fluid (1500-2000 ml) is important for the older person since the number of functioning nephrons is considerably lower, and the kidney must work harder to eliminate wastes. Fluids such as water, coffee, tea, milk, fruit juices, soft drinks, and clear soups can be used to increase fluid intake in the diet. However, the caffeine content of coffee, tea, and cold beverages may be too stimulating for some people, while others tolerate them well. Diet soft drinks may be substituted for regular soft drinks to keep the energy intake under control.

Medications

Many older persons take as many as 10-15 pills a day or more. When screening the patient for nutritional health, it is important to determine what prescribed medications, over-the-counter preparations, and/or vitamin/mineral supplements are being taken. The patient should be advised exactly when to take the medications, whether it should be taken with or without food, and what side effects such as dry mouth, nausea, diarrhea, and constipation may be expected.

DIETARY CONSIDERATIONS

The aging process may modify nutrient needs and/or utilization, but is not the only determining factor in providing meals for the older adult. Meals must be planned with the individual in mind and his/her specific needs for texture and nutrient modification to provide optimum nutrition.

Following are several age-related factors that may influence the individual older adult's ability to maintain adequate nutrition. Not all of these problems will occur for every individual nor will they necessarily persist as permanent concerns once noted.

I. Oral

- A. Dentition or Lack of Fitting Dentures: The inability to chew is perhaps the most common problem pertaining to the digestive tract. Many older adults require dentures that in some cases fit poorly or are not worn, or they have lost teeth or have sore gums.

Many older adults experience a declining sense of taste, sight, and/or smell that should be addressed if it limits intake. For the most part, seasoning of foods can compensate for loss of taste buds and bland foods should only be served when medically indicated. Foods should be colorful, well-seasoned and attractively served.

II. Gastrointestinal

- A. Impaired Digestion and Absorption: Decreases in gastric secretion and secretions of certain enzymes may result in decreased digestion and absorption of a variety of nutrients. Nutrients of particular concern are some vitamins and minerals; vitamin A, vitamin C, zinc, folate, dietary fats, vitamin B12, and iron. If specific food intolerances are noted, those foods should be avoided and substitutions should be made for those nutrients they contain. Encourage intake of iron-rich foods in combination with high vitamin C foods. Intakes of nutritionally adequate meals should be encouraged and special consideration should be given to protein and vitamin C rich foods.
- B. Decreased GI Motility: A decrease in the tone of the gastrointestinal muscles often occurs due to illness and/or drug usage. This may lead to delayed GI transit time and may cause abdominal distress. Adequate time between meals should be allowed to relieve discomfort. Four to six small meals are generally acceptable.

- C. Constipation: Increased GI transit time and/or inadequate intakes of fluids and fiber may lead to constipation. Emphasis should be placed on consuming raw and/or cooked fruits and vegetables and whole-grain breads and cereals in recommended amounts. Six to eight glasses of fluids are recommended along with physical activity as tolerated. Mineral oil should not be used, because it interferes with the absorption of the fat-soluble vitamins.
- D. Other: An excessive production of gas is fairly common for many older adults and may be due to swallowing air. Factors contributing to this problem include rapid eating or gulping of liquids, using a straw, chewing gum, sucking hard candies or other activities that causes the individual to swallow air. The cause of the problem should be identified and eliminated.

III. Personal Factors

- A. Handicapped Conditions: The older adult may have impairment of hand or arms that may make eating difficult. A stroke victim may have impaired function only on one side of his body. Adaptive utensils may be needed and the texture of food may need to be modified. Assistance with feeding may be needed, but the resident should be encouraged to be as independent as possible. An occupational therapist can be very helpful in developing an appropriate feeding plan. Food items may need to be served in open or easy-to-open containers or finger foods may need to be served. A speech or swallow therapist may provide evaluation and guidelines for safe feeding.
- B. Altered Emotional or Mental Status: Many changes take place in the later years of life that can have major consequences on the mental health of the individual. Grief and loneliness can lead to omission of meals, poor food choices, or overeating. Illness is sometimes overwhelming and can lead to fear of eating many foods. Depression is another common problem for the older adult. Alzheimer's disease affects about 5-8 percent of persons 65 years and older, but about one-third of persons over 85 years.

IV. Weight Control

- A. Underweight: Those who are 10-15 percent below weight are more prone to infections, longer illness, and somewhat higher mortality rate. Loss of weight due to medication problems and some illnesses may cause difficulty with adequate intake. The cause of any weight loss should be carefully identified and an appropriate care plan should be developed. Concentrated high-protein beverages may be needed to supplement the diet. Nutrient-dense foods should be encouraged since fewer calories are needed with aging, but protein, vitamin, and mineral requirements remain high. The meal plan should be liberalized for the elderly person if he/she is receiving a modified diet and the oral intake is poor. The height-weight standards recently published for men and women over 65 years and older are 10 percent more above the traditional standards that have been used for years. Gerontologists believe higher levels of body weight provide greater protection against illness, and can reduce the severity and length of illness.
- B. Obesity: Obesity in the older adult means greater stress on joints that are often arthritic, and greater demand in the respiratory and cardiovascular systems. Obesity is sometimes a problem for the older adult if long-standing eating habits of excessive calories are maintained and if activities are decreased. A weight control program should be developed, initiated, and carefully monitored since obesity is a risk factor for development of diabetes and cardiovascular diseases.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>RECOMMEND LESS OF</u>
Meat, Poultry, Fish, Dried Beans, Eggs, and Nuts (2-3 servings)	Lean meats, fish, poultry and shellfish, peanut butter, soybeans, dried beans and peas, tofu.	Fried or fatty meats and fish, fried poultry or poultry with skin, nuts, egg yolks.
Milk, Yogurt, and Cheese (2-3 servings)	Low-fat milk, low fat cheeses (cottage cheese and part skimmed mozzarella).	High fat milk (whole milk), high fat cheeses (cheddar and processed cheeses).
Breads, Cereals, Rice, and Pasta (6-11 servings)	Whole-grain and high fiber breads and cereals, low-sugar cereals.	Low-fiber and refined breads and cereals, high-sugar cereals.
Fruit (2-4 servings)	Unsweetened fruits and juices. Each day include one citrus juice or fruit or one tomato or tomato juice.	Sweetened fruits in heavy syrup, coconut, avocados, and sweetened juices.
Vegetable (3-5 servings)	Fresh, frozen, or canned, boiled or baked potato. Each day include one dark-green or deep-yellow vegetable, leafy vegetables.	Fried vegetables, chips, pickled vegetables, highly salted vegetables, or juices.
Fats, Oils, and Sweets (Use sparingly)	Desserts sweetened lightly and/or contain moderate fat (fruit-based desserts, angel-food cake, puddings made with skim milk).	Butter or lard. Desserts high in sugar and/or fat (cookies, pie, cake, candy, and puddings made with whole milk).

SAMPLE MEAL PLAN

BREAKFAST	LUNCH	DINNER
Orange Juice, 3/4cup Whole Grain Cereal, 3/4 cup Fruit, 1/2 cup Whole Wheat Toast, 2 slices Egg, 1 Bacon, 1 slice 2% Milk, 8 oz. Margarine, 1 tsp. Jelly, 1 Tbsp. Sugar, 1 tsp. Coffee/Tea	Vegetable Soup, 1 cup Whole Wheat Bread, 2 slices Roast Beef, 2-3 oz. Tossed Salad, 1 cup Italian Dressing, 1 Tbsp. Apple, 1 medium Graham Crackers, 3 Mayonnaise, 1 tsp. Mustard Catsup Coffee/Tea	Baked Chicken, 3 oz. Baked Potato, 1 small Green Beans, 1/2 cup Whole-Grain Roll, 1 Peaches, canned, 1/2 cup Margarine, 1 tsp. Angel Food Cake, 1/12 slice 2% Milk Coffee/Tea

This plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2285	
Protein	109	grams (19%)
Carbohydrates	333	grams (55%)
Total Fat	65	grams (26%)

REFERENCES

1. Robinson, Corinne H., Weigley, Emma S., and Mueller, Donna, *Basic Nutrition and Diet Therapy*, 7th Edition, New York, Macmillan Publishing Co., 1993, pp 261-269.
2. Dietetic Staff of Mayo Clinic, Rochester Methodist Hospital and St. Mary's Hospital of Rochester, Minnesota. *Mayo Clinic Diet Manual, A Handbook of Dietetic Practices*, 5th Edition, W.B. Saunders Co. Philadelphia, 1981, pp 20.
3. Mahan, L. Kathleen and Arlin, Marian, *Krause's Food Nutrition and Diet Therapy*, 8th Edition, Philadelphia, W.B. Saunders Co. 1992, pp 243-254.
4. Robinson, Corinne H., Lawler, Marilyn R., Chenoweth, Wanda L., Garwick, Anne E., *Normal and Therapeutic Nutrition*, 17th Edition, New York, Macmillan Publishing Co, 1986, pp 319-329.
5. American Dietetics Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
6. *Dietary Reference Intakes*, The National Academies Press, 2002.

NUTRITION FOR PREGNANCY AND LACTATION

PURPOSE

Prenatal nutrition is one of the most important factors influencing the health of a pregnant woman and her infant. The diet for pregnancy and lactation is a normal diet with increased amounts of calories, protein, minerals, and vitamins. This increase in nutrients provides for normal growth and development of the fetus, adequate maternal weight gain and successful lactation.

NUTRITIONAL ADEQUACY

These diets meet the Recommended Dietary Allowances, when the types and amounts of food suggested are included, with the exception of iron and possibly folate. Pregnant and lactating women should be encouraged to obtain their nutrients from well-balanced and varied food choices. (See list of high folate foods in the Appendix.)

DIET PRINCIPLES

The diet should be carefully selected to provide for increased nutrient needs without excessive calories. Pregnancy is never a time to lose weight.

Suggested weight gain:

If the pregnancy weight is:

90-120% of IBW
10% below IBW
20-35% above IBW
>35% over IBW

Recommended gain is:

25-35 pounds
28-40 pounds
15-25 pounds
15 pounds

Twins
Triplets

40+ pounds
50+ pounds

Adolescents

28-40 pounds

Suggested weight gain by trimester:

	<u>First Trimester</u>	<u>Second & Third Trimester</u>
Normal adult pre-pregnancy weight	3-8 pounds or 1-3.5 kg	1 pound or 0.4 kg/wk
Underweight pre-pregnancy	3-8 pounds	1+ pound or 0.5 kg/wk
Overweight pre-pregnancy	3-8 pounds	2/3 pound or 0.3 kg/wk
Obese pre-pregnancy		individual basis and based on medical judgment
Multiple gestation	3-8 pounds	1.5 pounds or 0.75 kg/wk more for triplets
Teens, normal weight	3-8 pounds	1-2 pounds/wk
Teens, underweight	3-8 pounds	1-3 pounds/wk

FOOD GROUPS**RECOMMENDED SERVINGS**

	Pregnancy	Breast feeding or Teenage Pregnancy
Meat, Poultry, Seafood and Eggs Lean beef, pork, chicken, fish, liver, cheese, dried beans, peas, lentils, peanut butter, nuts.	3 1/2	3 1/2 (7 oz. total /day)
Milk, Yogurt, and Cheese Whole, 2%, skim or evaporated milk, or buttermilk may be used as a beverage, yogurt, cheese and cheese products. Nonfat dry milk may be used in cooking.	4	5 (teen) 4 (older, prenatal and breastfeeding)
Bread, Cereal, Pasta, Rice Whole-grain or enriched, includes macaroni, noodles, spaghetti, and rice.	6	6
Fruit Oranges, grapefruit, cantaloupe, apricots, all others. One (1) medium or ½ cup portion fruit, ¾ cup juice, generally.	2-4	2-4
Vegetable Broccoli, cauliflower, cabbage, green beans, tomatoes, spinach, all others. One (1) cup raw, ½ cup cooked, or ½ cup juice.	3-4	3-4
Fats and Oils Use in moderation. All kinds. Includes margarine, butter, oil or mayonnaise, salad dressing, sour cream, gravy or cream cheese, bacon.	2 or more	2 or more
Other Includes desserts such as cake, cobbler, cookies, gelatin, sherbet, and snack items such as potato chips.	Occasionally	Occasionally, not to exceed caloric requirements.

SAMPLE MEAL PLAN

BREAKFAST	LUNCH	DINNER
Orange Juice, 1/2 cup	Vegetable Soup, 1 cup	Chicken Breast, 3 oz.
Bacon, 1 slice	Roast Beef, 3 oz.	Baked Potato, 1 medium
Whole Wheat Toast, 1 slice	Whole Wheat Toast, 1 slice	Broccoli, cooked, 1/2 cup
Egg, 1 large	Tossed Salad, 1 cup	Wheat Roll, 1
Cereal, 1 oz.	Italian Dressing, 1 Tbsp.	Margarine, 1 tsp.
2% Milk, 1 cup	Apple, 1 medium	Peach, 1 medium
Margarine, 1 tsp.	Mayonnaise, 1 Tbsp.	Angel Food Cake,
Jelly, 1 Tbsp.	Coffee/Tea	1/12 slice
Sugar, 2-3 tsp.		Coffee/Tea

SNACK

2% Milk, 1 cup
Vanilla Wafers, 6

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories.)

Calories	2292	
Protein	119	grams (21%)
Fat	79	grams (31%)
Carbohydrate	287	grams (50%)

SPECIAL ISSUES

GASTROINTESTINAL DISCOMFORT

Frequently, the first trimester experience includes “morning sickness”. This may be nausea accompanied by vomiting, and may occur at any time. Suggestions for relief include:

- Eat 5-6 small meals rather than 2-3 large meals
- Avoid hunger
- Select foods containing mostly carbohydrates
- Drink fluids between meals, rather than with meals
- Avoid fried foods or irritating foods
- Drink a small amount of 100% fruit juice every 1-2 hours

For additional concern of constipation suggestions include:

- Increase intake of foods high in insoluble fiber
- Regular physical exercise as allowed by physician
- Adequate rest and relaxation

For additional concern of heartburn suggestions include:

- Eat slowly in a relaxed atmosphere
- Avoid large meals before bedtime
- Avoid lying flat after eating
- Try plain crackers between meals
- Take medication only with permission of physician

OBESITY

Weight reduction during pregnancy is not recommended. Previously obese women may wish to control total weight gain by limiting foods with high caloric value and low nutrient density. Weight reduction regimens are not recommended during pregnancy because of the effect of ketosis on the developing fetus.

SWEETENERS

Saccharin containing sweeteners should be avoided during pregnancy. Use of other sweeteners should be limited to 1-2 servings per day. Beverages containing sweeteners should not be used to replace a beverage of important nutrient content.

SUPPLEMENTATION

Excessive use of vitamin and mineral supplementation (over 100% of RDA) should be avoided. Vitamin A supplementation should not exceed 800 RE (4000IU) daily. A supplement should contain iron and folate (folic acid). Improved food choices are more important than supplementation, because most nutrients are absorbed better from foods than from supplements, and many nutrients are not included in supplements. No single nutrient supplement should be used unless the health care provider prescribes one. Some single nutrient supplements can be toxic to the fetus and cause birth defects, or they might mask other nutrient deficiencies.

ALCOHOL

A safe limit of alcohol consumption during pregnancy is unknown. When pregnant, the only sure and safe way to avoid possible harmful effects of alcohol on the fetus is to avoid drinking alcoholic beverages entirely.

CAFFEINE

Because the effects of caffeine consumption during pregnancy are not clear, it is recommended that pregnant women reduce the amount of caffeine-containing beverages to two or less per day.

PICA

PICA is a psycho behavioral disorder that involves abnormal craving and ingestion of nonfood substances such as clay, starch or chalk. These nonfood substances may be harmful in a variety of ways and should be discouraged. Dietary assessment questions should include inquiry regarding possible pica behavior.

POTENTIAL NUTRITION-RELATED EFFECTS OF TOBACCO, ALCOHOL AND ILLEGAL DRUGS

- Impaired fetal growth
- Decreased maternal food intake. This may be due to decreased appetite, substitution of the substance for food, lack of money to spend on food, etc.
- Increased nutrient requirements. Tobacco increases metabolism and the need for vitamin C and folate. Alcohol impairs the absorption or utilization of several nutrients and may impair the placental transport of certain nutrients.
- Concern about body size and anxiety about gaining too much weight.

DIABETES MELLITUS

See the chapter on Diabetes in the Modification of Calories section.

NUTRITION DURING LACTATION

If the infant is fed by breastfeeding only, the mother needs to consume an additional 500 calories/day above the non-pregnant levels. The nutritional needs can be met by consuming a well-balanced diet from a variety of foods. No specific food needs to be eliminated unless the infant shows intolerance. If a specific food is in question, it should be avoided or consumed with follow-up documentation of the infant's response effect within the next 24 hours. Vitamin supplementation may be needed only by mothers who are malnourished. Supplement with 30-60 mg iron/day during the first three months postpartum. Drink fluids to satisfy thirst. No specific benefit has been evidenced for alcohol ingestion. If consumed, alcohol should be limited to no more than one oz. liquor, four oz. of table wine, or one can of beer per day. There is no evidence that herbal teas increase milk production.

Recommended:

- 4 dairy servings
- 7 oz. meat and/or substitutes
- 5 servings fruits and vegetables (one vitamin C source and one vitamin A source)
- 7 servings grains

NUTRITION FOR THE INFANT

PURPOSE

To provide a nutritionally adequate diet which is suitable in amounts and textures for infants from birth through the first 12 months of life.

NUTRITIONAL ADEQUACY

Exclusive breastfeeding results in normal infant growth when the maternal nutrition status is adequate, and the infant is exposed to sunlight (for Vitamin D development).

DIET PRINCIPLES

Breast milk or iron-fortified formula with the appropriate supplement vitamins and minerals, supply all known nutrients essential to proper growth and development from birth through the fourth and fifth month of life.

The timing of feedings should be 8-10 feedings in 24 hours for a length of 10-15 minutes minimum for every 1-1 ½ to 3 hours. Feedings will decrease to 5-8 around 3 months of age. It is normal for infants to lose 5-10% of birth weight in the first 10 days. Birth weight should be regained by 3 weeks. Weight gain of 4-7 ounces per week for the first 6 weeks is appropriate. The weight may double by 4 months, triple by one year. Growth spurts are likely at approximately 10-14 days, 4-6 weeks, at 3 months and at 6 months.

Normal elimination should include 6-8 wet diapers per day. Stools for the first 6 weeks are frequent, may be with every feeding, and should be at least one a day. (This does not include the first 3 days of life.) Any baby between 4-21 days who does not pass at least one substantial bowel movement within a 24 hour period should be seen by a doctor.

VITAMIN/MINERAL SUPPLEMENTS

Iron-fortified cereal should be introduced at 4-6 months of age. The supplementation of fluoride in the diet of healthy infants is no longer recommended. The decision should be based upon individual determinants, including family dental history and level of fluoride in the water supply (if less than .3 ppm; 25 mg of daily fluoride should be given.) Dark-skinned infants reared in climates where sunlight is minimal or the mother's intake of vitamin D is low, may be at risk unless supplemented with vitamin D (400 IU).

BASIC FEEDING PRINCIPLES

Breastfeeding is the preferred method for normal full-term infants for the first four to six months of life in the United States. If the mother cannot or chooses not to breastfeed, then the infant should be fed an iron-fortified infant formula. Infant formula contains the nutrients, determined by current research, that the infant needs most during the first year of life. It does not contain anti-infective agents. It should be from a reputable formula company and under the advice of a physician. Iron-fortified formula is recommended, because iron is needed for proper growth and development of the infant. Fresh pasteurized cow's milk and goat's milk are not acceptable for children under the age of one. They do not have the right balance of nutrients for the infant's first year of life and can cause allergic symptoms.

Expressed breast milk may be frozen and stored for use when the mother is unable to feed the infant. Formula should be prepared according to the instructions provided with the product. (Formula that has been frozen should not be used for infant feeding.)

There are three feeding periods: (1) Nursing, (2) Transitional—4-7 months, and (3) modified adult period—8-11 months. Weaning begins with the introduction of solid foods or with the transition of taking the liquid nourishment from the bottle or cup. Weaning should be a gradual process with planned progression. Inappropriate choice(s) of weaning food(s) can lead to protein-calorie malnutrition and nutrient deficiencies. Weaning to a cup should begin between 6 and 12 months. Start when the infant is well. The infant will not be able to handle a cup well until about 8 months of age, but early introduction helps the infant to become familiar with the cup. Begin gradually and progress to replacing one feeding at a time, and then additional feeding times when the infant is accustomed to the new feeding process. The bedtime feeding is usually the last to be replaced. Give the child more love and attention to help with the adjustment during these times.

Healthy newborns require little or no supplemental water. The fluid needs are met from breast milk or formula they take. The exception to this is in very hot weather. Additional water frequently is required when solid foods are introduced to help manage the renal osmolar load. One or two ounces of water can be offered as part of the feeding when meats are introduced.

Introduction of solid foods should be delayed until four to six months of age. The infant is ready for solid foods when he/she is about to: sit up with support, swallow without choking, drool, open mouth for approaching food, indicate disinterest or satiety. New foods should be introduced one at a time and at weekly intervals to check for food intolerance.

Single-grain infant cereal; rice, barley and oatmeal are good first choices. Mixed and wheat containing cereals should be postponed until the infant is at least 9 months of age. Cereals may be mixed with expressed breast milk, formula, or juice to form a thin consistency. Solid foods should be fed from a spoon, never from a bottle. It should be served plain without added sugar, honey, syrup, or margarine. Other solid foods may be added one at a time at weekly intervals. The order of introduction is not critical, usually vegetables, fruits and then meats. Most foods will be accepted by the infant if presented in a positive manner. It is important that the infant receive rich food sources of protein. Avoid selecting “combination” or “high meat dinners” as the protein content of the products is low compared to that of the strained meats. High protein cereal is usually a good choice after single grain cereals are offered and tolerated.

Cooked egg yolk may be introduced at 7-10 months of age. It should be hard-cooked, mashed with a fork, and mixed with a little formula to form a thin consistency. Egg white introduction should be postponed until the infant is one year of age to deter allergic reaction. Dairy products of mild yellow cheese or plain yogurt may be added when the infant is 8-10 months of age. Yogurt with non-nutritive sweeteners or aspartame is not recommended. Do not restrict fat and cholesterol in the diet. Infants need calories, fat, and cholesterol for the development of their brains and nervous system and for general growth. Encourage the older infant to feed him/herself by picking up soft food(s) with the fingers. The infant should be eating table foods by 10-12 months.

Do not offer shellfish, cocoa, chocolate, egg white, or citrus juice before one year of age. Sweetened beverages, soda or drinks may contribute to dental caries or poor food habits.

During the first year of life the infant has a high fat-to-lean ratio. The tendency to encourage infants to finish a bottle feeding may be a predisposing factor to obesity. Overfeeding during the first year of life may be the beginning of a lifetime problem. The parents should assure proper quality and adequate quantity of food in a positive atmosphere. The infant should be responsible for how much is eaten and whether it is eaten. The infant’s eating may vary day-to-day. The rate of growth of the infant is the best indicator to determine if he/she is getting enough. Good eating habits developed in infancy may have a theoretic chance of decreasing the risk of obesity during adult life.

**Recommended Guide for Feeding the Infant
month by month**

	Birht-1 mo	1-2 mo	2-3 mo	3-4 mo	4-5 mo	5-6 mo	6-7 mo	7-8 mo	8-10 mo	10-12 mo
Breastfeeding	8-12 times	8-12 times ⇒	6-8 times ⇒	6-8 times ⇒	5-8 times ⇒	5-8 times ⇒	5-6 times ⇒	4-6 times ⇒	2-5 times ⇒	2-4 times ⇒
OR	or on demand									
Iron-fortified formula	20-24 oz.	24-28 oz.	28-30 oz.	30-33 oz.	32-34 oz.	32-34 oz.	32-34 oz.	26-32 oz.	26-28 oz.	20-24 oz.
Iron-fortified cereals					1-2 Tbsp.	2-3 Tbsp.	4-5 Tbsp.	6-8 Tbsp.	8-12 Tbsp.	9-12 Tbsp.
Vegetables						1-3 Tbsp.	3- Tbsp. or 1/2 Jar	4-6 Tbsp.	6-10 Tbsp.	6-12 Tbsp.
Fruits							2-3 Tbsp.	4-6 Tbsp.	6-10 Tbsp.	6-12 Tbsp.
Fruit Juices (no citrus)							2-4 oz.	2-4 oz.	4 oz.	4-6 oz.
Dry toast or <u>teething biscuit</u>							can add	as needed	as needed	<u>as needed</u>
Bread										1/2 to 1 slice
Meat/meat substitutes								1 Tbsp.- 2 Tbsp.	1-3 Tbsp.	3-4 Tbsp.
Egg								yolk only	yolk only	whole egg at 1 yr
Dried beans (soft, no skins, thinned)								can add	as desired	as desired
Cheese, cottage, mild yellow									can add	as desired
Yogurt, plain, no seeds/skins									can add	as desired
Macaroni, noodles, pasta										as desired

NUTRITION FOR TODDLERS AND CHILDREN

PURPOSE

The purpose of this diet is to provide adequate nutrition for healthy growth and development of toddlers and children between the ages of one to eleven years of age, who require no dietary modification.

NUTRITIONAL ADEQUACY

These meal plans encourage a variety of foods and meet the Recommended Dietary Allowances for toddlers and children from one to eleven years of age. As long as the child is growing well, then he/she is getting enough to eat. Children have small stomachs and meals should be offered in smaller volume with snacks between meals. During the second year the child's appetite normally begins to decrease, as there is a gradual reduction in energy needs relative to body weight. During this same time, nutrient needs of protein, vitamins, and minerals gradually increase.

PRINCIPLES OF NUTRITION

The parent is responsible for providing the child with nourishing, healthful foods at regular times and supplemented with snacks 2-3 times per day. A positive supportive environment helps to make eating and mealtimes pleasant. Parents and adults are powerful role models for children. Desirable eating habits with a personal internal awareness of an appropriate amount to be consumed can be demonstrated and taught by daily example.

A child is responsible for determining what to eat of appropriate choices available, how much to eat or whether to eat at all. The environment should make it easy for the child to eat. Finger foods are usually accepted. He/she should be encouraged to self-feed and to explore new foods. Foods are usually accepted better if served simply and as separate foods of mild flavors. They should be served with a variety of textures, colors, and flavors. Meals should be served without judgmental comments about the character of the child or "good versus bad" character of the foods. Using foods as a reward or punishment should be avoided.

All preschool children are at risk for iron-deficiency anemia, especially children of low-income families. Iron rich foods should be offered frequently. (See table for high iron foods in the Appendix.)

Children ages six to eleven experience a period of steady growth. Appetite increases naturally, leading to normal increases of intake. Food preferences are established, but not permanently. Children should still be encouraged to try new foods. Snacks remain an important component of the child's nutrition. Energy expenditure may decrease, if the child spends a significant portion of the day watching television. Exercise is important to maintain overall health, at this and any age. Fats and cholesterol should not be restricted for children two years and younger. Fat and cholesterol are necessary for brain development and growth. However, the total fat may comprise 30-40 % of the total daily caloric intake. Healthy eating and lifestyle habits begin early in life. Calcium, vitamin C, fluoride, and foods that require chewing (like fresh fruits and vegetables) promote good dental health.

Snacks should be offered two to three times per day, and should be limited to nutritious foods from the basic food groups.

Fiber intake is recommended by the American Academy of Pediatrics to be age +5 to age +10 = grams dietary fiber per day [0.5 grams of dietary fiber/kg body weight.] See fiber information in Increased Fiber Diet section.

Recommended Minimum Daily Food Guide for Toddlers 1-3 Years Old

Group	Serving Size
Breads/Cereal, Rice and Pasta (6 servings)	1/2 slice of bread 1/2 slice hamburger or hotdog bun 1/2 dinner roll, muffin, or biscuit 1/2 piece cornbread (2 in. square)
Use whole grains whenever possible	2 crackers 1 graham cracker square (a square is 2" x 2") 1/3 cup rice, macaroni, other types of pasta, cooked cereal 1/2 cup ready to eat (RTE) cereal 1/2 tortilla or taco shell 1/2 waffle 1-4" pancake
Vegetables § (3 servings)	1/2 cup raw vegetables or 1/2 carrot, 1/2 stalk celery, 1/2 small tomato 1/3 cup cooked or canned 1/3 cup juice
Fruits § (2 servings)	1/2 small raw apple, banana, orange, peach, pear, etc. or 1/3 cup fresh (berries, grapes, cantaloupe, melon) 1/3 cup canned or cooked 1/3 cup juice 2 Tbsp. raisins or other dried fruit
Milk (5 servings)	1/2 cup fluid milk (any kind) 1/2 cup reconstituted powdered or evaporated milk 1/2 cup buttermilk 1/2 cup (4 oz.) yogurt 3/4 oz. natural cheese; 1/4 cup shredded 2 Tbsp. parmesan cheese 1 oz. American, cheese spread or cheese food ** 1 cup cottage cheese 3/4 cup ice cream or frozen yogurt 1/2 cup pudding or custard made with milk; milkshake 3/4 cup cream soup made with milk
Meats § (2 servings)	1 oz. meat (for example: beef, pork, ham, game) 1 oz. poultry (for example: chicken, turkey) 1 oz. fish or seafood 1/4 cup tuna or salmon or other canned meat 1 egg 1 hotdog § ** 2 slices or 1 oz. luncheon meat ** 2 fish sticks 2 Tbsp. peanut butter * 1/2 cup cooked dried beans, peas or lentils *

Group	Serving Size
Fats, Oils, Sweets, Other Foods (Use sparingly)	1 tsp. margarine, butter, cooking oil, mayonnaise 2 tsp. mayonnaise-based salad dressing 1 Tbsp. salad dressing, cream cheese, sour cream, heavy cream 1 slice bacon 1 Tbsp. gravy Sugar, jelly, jam, honey, cakes, cookies, pie, pastry, candy, soda, fruit drinks Chips, cheese puffs, salt pork

§ = raw carrots, radishes, cauliflower, whole grapes and popcorn are not recommended for young children because they may cause choking. Carrot coins and grapes should be quartered before giving to your child. Hot dogs should be quartered and cut in to small pieces before giving to your child. No round pieces.

** = higher in fat and sodium

* = not a complete protein—serve with a bread, cereal, or grain

SAMPLE MEAL PLANS FOR 1-3 YEAR OLDS

BREAKFAST

Orange Juice, 1/2 cup
Whole Wheat Toast, 1/2 slice
Bacon, 1/2 slice
Egg, 1 small-medium
2% Milk, 1 cup
Margarine, 2 tsp.
Jelly, 1 tsp.
Sugar, 1 tsp.

LUNCH

Vegetable Soup, 1/2 cup
Roast Beef, 1 oz.
Whole Wheat Bread, 1 slice
Apple, 1/2 small
Mayonnaise, 1 tsp. (optional)
2% Milk, 1 cup

DINNER

Chicken Breast, 1.5 oz.
Baked Potato, 1/2 small
Broccoli, cooked, 1/2 cup
Peach, 1/2 medium
Angel Food Cake, 1/2 of 1/12 slice

SNACK

Banana, 1/2 small
Ice Cream, 1/4 cup
2% Milk, 1 cup
Vanilla Wafers, 4

The plan can be individualized to meet nutrition needs.

The diet as listed in the Sample Meal Plan contains approximately:

Calories	1171
Protein	56 grams
Fat	41 grams
Carbohydrate	151 grams

Recommended Minimum Daily Food Guide for Preschool Children 4-6 Year Olds

Group	Serving Size
Breads, Cereal, Rice and Pasta (6 servings)	1 slice of bread 1/2 hamburger or hotdog bun 1 roll, muffin, or biscuit 1 piece cornbread (2" square) 4 crackers
Use whole grains whenever possible	2 graham cracker squares (1 square is 2" x 2") 1/2 cup rice, macaroni, other types of pasta, cooked cereal 3/4 cup ready-to-eat cereal 1 tortilla or taco shell 1 waffle 2-4" pancakes
Vegetables (3 servings)	1/2 cup raw vegetables or 1 carrot, 1 stalk celery, 1 small tomato 1/2 grapefruit 1/2 cup canned or cooked 1/2 cup juice 1/4 cup raisins or other dried fruit
Fruits (2 servings)	1 small raw apple, banana, orange, peach, pear, etc. or 1/2 cup fresh (berries, grapes, cantaloupe, melon, etc.) 1/2 grapefruit 1/2 cup canned or cooked 1/2 cup juice 1/4 cup raisins or other dried fruit
Milk (6 servings)	1/2 cup fluid milk (any kind) 1/2 cup reconstituted powdered or evaporated milk 1/2 cup buttermilk 1/2 cup yogurt 1/2 oz. natural cheese; 1/4 cup shredded 2 Tbsp. parmesan cheese 1 oz. American, cheese spread or cheese food ** 1 cup cottage cheese 3/4 cup ice cream 1/2 cup pudding or custard made with milk; milkshake 3/4 cup frozen yogurt 3/4 cup cream soup made with milk
Meats (2 servings)	1 oz. meat (for example: beef, pork, ham, game) 1 oz. poultry (for example: chicken, turkey) 1 oz. fish or seafood 1/4 cup tuna or salmon or other canned meat 1 egg 1 hotdog 2 slices or 1 oz. luncheon meat ** 2 fish sticks 2 Tbsp. peanut butter * 1/2 cup cooked, dried beans, peas, or lentils * 1/4 cup nuts, pumpkin, or sunflower seeds *

Group	Serving Size
Fats, Oils, Sweets, Other Foods (Use Sparingly)	1 tsp. margarine, butter, cooking oil, mayonnaise 2 tsp. mayonnaise-based salad dressing 1 Tbsp. salad dressing, cream cheese, sour cream, heavy cream 1 slice bacon 1 Tbsp. gravy sugar, jelly, jam, honey, cakes, cookies, pie, pastry, candy, soda, fruit drinks, chips, cheese puffs, and salt pork

** = higher in fat and sodium

* = not a complete protein—serve with a bread, cereal, or grain

SAMPLE MEAL PLAN FOR 4-6 YEAR OLDS

BREAKFAST

Orange Juice, 1/2 cup
Whole Wheat toast, 1 slice
Bacon, 1 slice
Egg, 1
2% Milk, 1 cup
Margarine, 2 tsp.
Jelly, 1 Tbsp.
Sugar, 1-3 tsp.

LUNCH

Vegetable Soup, 1/2 cup
Roast Beef, 1.5 oz.
Whole Wheat Bread, 1 slice
Apple, 1 small
Mayonnaise, 1 tsp.
2% Milk, 1 cup

DINNER

Chicken Breast, 2 oz.
Baked Potato, 1 small
Broccoli, cooked, 1/2 cup
Peach, 1 medium
Angel Food Cake, 1/12 slice

SNACK

Carrot, 1 raw
Banana, 1 small
Ice Cream, 1/2 cup
2% Milk, 1 cup
Vanilla Wafers, 6

Calories	1733
Protein	73grams
Fat	61grams
Carbohydrate	240grams

NUTRITION FOR ADOLESCENTS AND YOUNG ADULTS

PURPOSE

Rapid growth occurs during the adolescent years. Growth spurts are characterized by rapid psychological, social, intellectual, and physical changes. Nutritional needs vary in conjunction with the rate of growth being experienced, activity level and physical maturity.

NUTRITIONAL ADEQUACY

When a variety of foods are consumed, the diet meets the Recommended Dietary Allowances for adolescents. Due to common restrictive food preferences, the food intake of American adolescents is frequently insufficient for iron, zinc, folic acid and nutrients found in dairy products.

NUTRITIONAL NEEDS

Nutritional needs vary with age, gender, stage of growth and activity level. Eating patterns of adolescents are often characterized by skipping meals, eating more meals outside the home, frequent snacking, dieting and use of fad diets.

Energy

Energy needs of adolescents vary based on activity level and stage of maturation. Because there is a considerable variation in growth rates and timing of growth spurts, assessment of energy needs should be based on appetite, activity, health status and weight gain in relation to subcutaneous fat deposition. Because the RDA energy levels are averages over an age range, formulas that estimate energy needs based on age and height such as the Harris Benedict equation, may approximate actually energy needs more closely. See Appendix for more information.

Protein

The RDA for protein ranges from 45 gm/day to 59 gm/day for adolescents and young adults based on age groupings. (See Appendix) However, protein needs correlate more closely with growth pattern than with actual age. Adequacy of energy intake is a factor that determines how protein is used by the body. Conditions that increase risk of an inadequate protein intake include eating plans that eliminate or limit meat, poultry, fish and/or dairy products, eating disorders, chronic dieting, certain medical problems (such as inflammatory bowel disease), heavy physical activity, and pregnancy.

Fat and Cholesterol

The American Academy of Pediatrics Committee on Nutrition recommends that fat should constitute approximately 30% of total calories during the first two decades of life. Saturated fat should consist of less than 10% of total calories, and dietary cholesterol less than 300 mg/day. Foods lower in fat and saturated fat, such as lean meats, poultry, fish, and low-fat dairy products should be emphasized in meal planning.

Vitamins and Minerals

The growth rate(s) of adolescents is second only to the fetal period. During spurts of growth, adolescents may consume twice the amount of calcium, iron, zinc, and magnesium than at other times. Vitamins such as vitamin D, thiamin, riboflavin, and niacin are recommended in large amounts to meet high energy requirements. The importance of these nutrients cannot be overemphasized. With the erratic meal patterns and food choices common to teenagers, these very nutrients are consumed in limited amounts. With the exception of iron in female athletes and male endurance runners, all of these needed nutrients can be supplied by a well-balanced food selection.

Special Conditions

Problems encountered by teenagers may vary greatly. Excessive intakes of fat, sugar, protein and sodium have been observed most commonly. The individual with a high activity level for sports or rapid growth spurts may need frequent well-chosen snacks to meet nutritional requirements.

Other common problems include over-restricting of caloric intake in effort to control weight. This is an age that is especially sensitive to developing self-image. A changing mental image and outlook may predispose the possibility of eating disorders.

Overweight in teenagers is increasing in prevalence, as in other age groups. The adolescent should be evaluated by body mass index (weight/height² or kg/m²) -for-age (BMI-for-age). Adolescents with BMI-for-age at or above the 95th percentile for age and sex are considered overweight. A BMI-for-age between the 85th and 95th percentile is considered at risk of overweight. More information can be found at <http://www.cdc.gov/nccdphp/dnpa/growthcharts/training/modules>. Dietary modifications to stop or slow down weight gain may be most beneficial. Actual weight loss and unrealistic goals of actual weight loss should be discouraged. Family support and education is imperative for the adolescent trying to improve weight management. The most fundamental requisite to facilitate adolescent weight management is the individual's personal willingness to change.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>SERVING SIZE</u>
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts (2 1/2 servings)	Any.	2-3 oz. meat or cheese, or 1 cup legumes, or 4 tbsp. peanut butter.
Milk, Yogurt, Cheese (3 servings)	Any.	1 cup milk or 1 oz. cheese.
Bread, Cereal, Rice, and Pastas (6-11 servings)	Any.	1 slice bread, or 1/2 cup cooked pasta or rice.
Fruit* (2 servings)	Any.	1/2 cup canned fruit or 1 piece of fruit.
Vegetable* (3 servings)	Any.	1/2 cup cooked or 1 cup raw.
Fats and Oils (Use in moderation)	Margarine, butter, oils, bacon, plain gravies, or salad dressing.	
Other (Use in moderation)	Desserts: cake, cobbler, sherbet, cookies, or chips.	
Beverages and Fluids (As desired, in moderation: not to replace other needed as milk or 100% juice.)	Carbonated drinks, cocoa, coffee, tea, fruit drinks, or broth.	
Miscellaneous (As desired, in moderation)	Condiments, spices, candy, honey, jelly.	

* One vitamin C-rich and one vitamin A-rich source should be chosen from the fruit or vegetable groups.

Daily consumption of one or more servings of folate-rich foods should be encouraged.

SAMPLE MEAL PLAN

BREAKFAST

Orange Juice, 1/2 cup
Bacon, 1 slice
Whole Wheat Toast, 1 slice
Egg, 1 large
Cereal, 1 oz.
2% Milk, 1 cup
Margarine, 1 tsp.
Jelly, 1 Tbsp.
Sugar, 2-3 tsp.

LUNCH

Vegetable Soup, 1 cup
Roast Beef, 3 oz.
Whole Wheat Bread, 2 slices
Tossed Salad, 1 cup
Italian Dressing, 1 Tbsp.
Apple, 1 medium
Mayonnaise, 1 Tbsp.
2% Milk, 1 cup

DINNER

Chicken Breast, 3 oz.
Baked Potato, 1 medium
Broccoli, cooked, 1/2 cup
Wheat Roll, 1
Margarine, 1 tsp.
Peach, 1 medium
Angel Food Cake, 1/12 slice
Coffee/Tea

SNACK

2% Milk, 1 cup
Vanilla Wafers, 6

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2417
Protein	127 grams (21%)
Fat	83 grams (30%)
Carbohydrate	299 grams (49%)

REFERENCES:

1. Mahan, L.K., Escott-Stump, S., *Krause's Food, Nutrition, and Diet Therapy*, 9th Edition, W.B. Saunders Company, 1996.
2. Missouri Department of Health, Missouri Department of Social Services, *Missouri Diet Manual*, 8th Edition, 1996.
3. The American Dietetic Association, *Manual of Clinical Dietetics*, 6th Edition, 2000.

VEGETARIAN DIET

PURPOSE

To provide a diet composed primarily of plant foods that may or may not include dairy products and eggs. It is designed to provide a variety of foods that supply adequate amounts of all required nutrients for the body.

NUTRITIONAL ADEQUACY

The vegetarian diet meets the Recommended Dietary Allowance (RDA) for all nutrients when well planned. A variety of foods must be chosen in accordance with the Dietary Guidelines for Americans. Strict vegans must ensure adequacy of calories, vitamin D, vitamin B¹², and iron.

DIET PRINCIPLES

The term vegetarian encompasses a variety of eating patterns. The traditional classification of vegetarian diets are listed below:

Classification	Foods included	Foods Excluded
Lacto-ovovegetarian	Fruits, grains, legumes, nuts, seeds, vegetables, milk, dairy products, eggs.	Meat, poultry, fish, seafood.
Lacto-vegetarian	Fruits, grains, legumes, nuts, seeds, vegetables, milk, dairy products.	Meat, poultry, fish, seafood, eggs.
Ovo-vegetarian	Fruits, grains, legumes, nuts, seeds, vegetables, eggs.	Meat, poultry, fish, seafood, milk, dairy products.
Vegan	Fruits, grains, legumes, nuts, seeds, vegetables.	Meat, poultry, fish, seafood, milk, dairy products, honey, eggs.
Macrobiotic	Unrefined/unprocessed grains, commonly brown rice, with smaller amounts of fruits, vegetables, and legumes; milk and dairy products optional.	Meats, poultry, fish (by some), eggs, processed foods, <i>Solance</i> species (i.e. tomatoes, eggplants, and potatoes), supplements (by some).
Fruitarianism	Raw fruits, nuts, seeds, and berries.	All other foods.

©2000, American Dietetic Association. "Manual of Clinical Dietetics, 6th Edition." Used with permission.

There are many reasons people choose to become vegetarians. Some of the more common reasons include: health, ecological, religious concerns, dislike of meat, compassion for animals, belief in non-violence, and economics.

Recent studies indicate vegetarians have lower mortality rates from any chronic, degenerative diseases vs. non-vegetarians. Besides the difference in diets other lifestyle characteristics of vegetarians must be considered, such as maintaining a desirable body weight, participating in regular physical activity, and abstaining from smoking, alcohol, and illicit drugs.

Meal Planning

- Choose a wide variety of foods, including whole grains, vegetables, fruits, legumes, nuts, seeds, and, if desired, dairy products and eggs.
- Ensure energy needs are met.
- Follow the Dietary Guidelines for Americans and Canadian Guidelines for Health Eating.
- Keep foods of low nutrient density, such as sweets and fatty foods, to a minimum.
- Choose whole or unrefined grain and cereal products whenever possible, and if using refined products, select those that are fortified or enriched. Minimize intake of highly sweetened, fatty, and heavily refined foods.
- Consume a variety of fruits and vegetables, including good sources of vitamin C and beta-carotene (e.g., deep-orange, yellow, and green hues).
- If animal foods such as dairy products and eggs are consumed, use low-fat or nonfat versions of these products.
- Cheeses and other high-fat dairy foods and eggs should be limited in the diet because of their saturated fat content and because their frequent use displaces plant foods in some vegetarian diets).
- Vegans should have a reliable source of vitamin B¹² such as fortified products (meat analogs, commercial breakfast cereals, nutritional yeast, soy, or grain beverages) or a B¹² supplement. A vitamin D supplement of fortified food is indicated if exposure to sunlight is limited.
- Vegetarian and non-vegetarian infants who are solely breast-fed should receive a vitamin D supplement; infants beyond 4 months to 6 months of age should receive supplements of iron. Exclusively breast-fed vegan infants should have vitamin B¹² supplements if the mother's diet is not fortified.
- Do not restrict dietary fat in children younger than two years of age. For older children, include some higher fat foods (e.g., nuts, seeds, nut and seed butters, avocado, and vegetable oils) to meet nutrient and energy needs.
- Include a source of omega-3 fatty acids, such as flaxseed oil, unrefined canola or soybean oil, or walnuts.

©2000, American Dietetic Association. "Manual of Clinical Dietetics, 6th Edition." Used with permission.

Major Nutrients to Consider When Planning Vegetarian Diets

Calories. Sufficient calories must be provided to meet energy needs, maintain weight, promote optimal growth in children, and spare protein for tissue maintenance and growth. Vegetarian diets tend to be lower in fat, therefore lower in calories.

Protein. Vegetarian diets often provide less protein than non-vegetarian diets, yet they meet or exceed the RDA for protein. Essential amino acids are found in both plant and animal sources of protein, though plants often contain less of the essential amino acids. A variety of protein containing foods should be consumed over the course of the day to provide the necessary amino acids. Those vegetarians who consume milk, dairy products, and eggs have no difficulty meeting their protein needs. Good plant sources of protein include: grains, legumes, vegetables, nuts, and soy foods. Soy protein has been found to be the nutritional equivalent of animal protein and can be the sole source of protein intake.

Calcium. Vegetarians absorb calcium more efficiently than non-vegetarians. Oxalic acid, found in some dark green leafy vegetables, does not appear to effect the body's ability to absorb calcium. In the U.S. the RDA for calcium is higher due to the high protein intake of most

Americans. The increase in calcium allows for the calciuric effect of the typical high protein diet. The calcium needs of vegans tend to be lower than the U.S. RDA because their diets are moderate in protein. Vegans, and those who do not consume milk must be encouraged to include good calcium sources in their diets daily. (See Appendix)

Vitamin D. Vitamin D is necessary for the absorption of calcium. Vegetarians with no dietary sources of vitamin D, and who have limited exposure to sunlight, may need a vitamin D supplement.

Vitamin B¹². Vitamin B¹² is found only in animal products. If eggs and/or milk are consumed sufficient amounts of vitamin B¹² will be provided. Vegans may be at risk if sources of vitamin B¹² are not included in the diet. Cyanocobalamin is the physiologically active form of vitamin B¹² for humans. Cyanocobalamin is available as a supplement or fortified in some foods: fortified soy milk, some breakfast cereals, i.e., Grape Nuts, some brands of nutritional yeast, i.e., Red Star nutritional yeast T6635.

Iron. For vegetarians the primary source of iron is a non-heme source, since heme iron is found only in animal tissue. Factors which may decrease the absorption of non-heme iron include phytic acid in whole grain cereals, oxalic acid, tannic acid, and soy protein. Vegetarians typically have a high vitamin C intake which enhances the absorption of iron from non-heme and heme sources. Encourage good sources of non-heme iron daily, such as whole grains, iron fortified cereals, legumes, nuts, green leafy vegetables, eggs, dried fruit, brewers yeast, black strap molasses. (See Appendix)

Zinc. Among the best dietary sources of zinc for vegetarians are tofu, nuts, and seeds (especially cashews, pecans, pine nuts, and pumpkin seed), beans, zinc-fortified meat analogs, whole grain cereal, and eggs.

Omega-3 Fatty Acids. Diets that do not include fish or eggs lack the long-chain omega-3 acids docosahexanoic acid (DHA) and eicosapentanoic acid (EPA); however, there are now vegetarian sources of DHA from microalgae currently available on the market in vegetarian gelatin capsules. In fact, fish do not make these omega-3's; the original source of EPA and DHA for fish are phytoplankton and algae.

Vegetarian Resources

The Seventh-day Adventist Dietetic Association
The Vegetarian/Vegan Resource
2100 Douglas Boulevard
Roseville, CA 95661
(916)782-5200

Vegetarian Nutrition
(Practice Group of American Dietetic Associations)
120 South Riverside Plaza
Chicago, IL 60606
(800)877-1600

The Vegetarian Resource Group/Vegetarian Journal
Box 1463
Baltimore, MD 21203
(410)366-VEGE

United Soybean Board
PO Box 419200
St. Louis, MO 63141
(518)568-7970

Veggie Life Magazine
1041 Shary Circle
Concorde, CA 94518

International Vegetarian Union
<http://www.ivu.org>

FOOD GUIDE (SERVINGS/DAY)

FOOD GROUP	LACTO-OVOVEGETARIAN	VEGAN
Breads, Cereals, Rice, Pasta	6-11	6-12
Legumes, Soy products, Meat analogs	1-2	1-3
Nuts and Seeds	1-2	1-2
Vegetables	3-5	2-4
Fruits (include good source of vitamin C)	2-4	2-6
Milk and Dairy	2-3	
Fortified Milk Alternatives		1-3
Eggs	Use moderately	
Fats and oils	Use moderately	Use moderately
Sweets	Use moderately	Use moderately

LACTO-OVOVEGETARIAN SAMPLE MEAL PLAN

BREAKFAST	LUNCH OR SUPPER	DINNER
Egg, 1	Split Pea Soup, 1 cup	Burritos (2)
Whole Grain Cereal, 3/4 cup	Whole Wheat Bread, 1 slice	Soft Corn Tortillas, 2
Fruit, 1/2 cup	Low-Fat Cottage Cheese, 1/2 cup	Pinto Beans, 1 cup
Whole Wheat Toast, 1 slice	Salad: Mixed Greens, 1 cup	Lettuce, Tomato, Salsa, Onion
Orange Juice, 3/4 cup	Raw Vegetables, 1 cup	Broccoli, 1/2 cup
2% Milk, 1 cup	Vinegar and Oil Dressing, 1 Tbsp.	Peaches, (sliced) 1/2 cup
Margarine, 1 tsp.	Apple, 1 medium	Angle Food Cake, 1 oz.
Graham Crackers, 4	Graham Crackers 4	2% Milk, 1 cup
Jelly, Sugar	Coffee/Tea	Coffee/Tea
Coffee/Tea		

SNACK

Peanut Butter, 2 Tbsp.
Whole Wheat Bagel, 1 medium
Juice, 3/4 cup

This plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (%-Percent of Total Calories)

Calories	2512		
Sodium	3671	milligrams	Dietary Fiber 49 grams
Protein	107	grams (17%)	Potassium 4687 milligrams
Carbohydrates	420	grams (67%)	Iron 25 milligrams
Total Fat	56	grams (20%)	
Cholesterol	300	milligrams	

VEGAN SAMPLE MEAL PLAN

BREAKFAST

Orange Juice, 3/4 cup
Whole Grain Cereal, 3/4 cup
Fruit, 1/2 cup
Soy Milk, 1/2 cup
Whole Wheat Bagel, 1 medium
Peanut Butter, 2 Tbsp.
Jelly
Coffee/Tea

LUNCH

Split Pea Soup, 1 1/2 cups
Brown Rice, 1/2 cup
Whole Wheat Bread, 1 slice
Mixed Green Salad,
Mixed Greens, 1 cup
Tofu, 3.5 oz.
Raw Vegetables, 1 cup
Vinegar and Oil Dressing, 1 Tbsp.
Apple, 1 medium
Graham Crackers, 4
Coffee/Tea

DINNER

Burritos (2)
Soft Corn Tortillas, 2
Pinto Beans, 1 cup
Lettuce, Tomato, Onion
Salsa, 2 Tbsp.
Broccoli, 1/2 cup
Collard Greens, 1/2 cup
Peaches, (sliced) 1/2 cup
Angel Food Cake, 1 oz.
Coffee/Tea

SNACK

Fresh Fruit, 1
Nuts or Seeds, 1 oz.

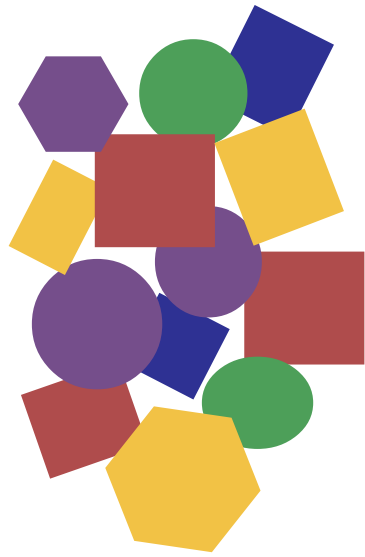
The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (%-Percent of Total Calories)

Calories	2560	Dietary Fiber	54 grams
Protein	88 grams (14%)	Sodium	3436 milligrams
Carbohydrate	436 grams (68%)	Potassium	3752 milligrams
Total Fat	64 grams (22%)	Iron	27 milligrams
Cholesterol	0 milligrams		

REFERENCE:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 6th Edition, 2000.
2. American Dietetic Association, *Position of the American Dietetic Association: Vegetarian Diet*. Journal of American Dietetic Association, 1997; Volume 97, number 11: 1317-1321.
3. Havala, Suzanne, *Nutrition Frontier Update* 1995, St. Louis Dietetic Association, September 28, 1995.
4. Mahan, L.K., Escott-Stump, Sylvia, *Krause's Food, Nutrition and Diet Therapy*, 10th Edition, W.B. Saunders Company, Harcourt Brace and Company, 2000.
5. Nelson, J., Mayo Clinic Diet Manual, *A Handbook of Nutrition Practices*, 7th Edition, Mosby Year Book, Inc., St. Louis, MO., 1994.
6. Topics In Clinical Nutrition, *Vegetarian Diets*, Aspen Publications, Inc. Volume 10/number 2, March, 1995.



Modifications In Consistency

CLEAR LIQUID DIET

PURPOSE

To provide relief from thirst and allow limited oral intake with minimal stimulation to the gastrointestinal tract for a short time.

NUTRITIONAL ADEQUACY

The clear liquid diet without supplementation is nutritionally inadequate and does not meet the Recommended Dietary Allowances. Several nutritional supplements may be incorporated to add needed calories and protein to the dietary intake. It is recommended that if a patient is to be on a clear liquid diet that one of the appropriate nutritional supplements is used. See Enteral Alimentation Section.

DIET PRINCIPLES

This diet prevents dehydration and reduces bowel activity. This diet should only be used for a short time either preoperatively, in preparation for tests involving the bowel, or as the initial stage of progression towards solid food.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dried Beans, Eggs, and Nuts	None.	All.
Milk, Yogurt, and Cheese	None.	All.
Bread, Cereal, Rice, and Pasta	None.	All.
Fruit and Fruit Juice	Apple juice, cranberry juice, grape juice as desired.	All others.
Vegetables	None.	All.
Fats and Oils	None.	All.
Other	Gelatin or gelatin dessert, popsicles as desired, high protein gelatin.	All others.
Beverages and Fluids	Carbonated beverages, coffee, coffee substitute, decaffeinated coffee, tea, Kool-Aid, fat-free broth or bouillon, high protein broth.	All others.
Miscellaneous	Salt, sugar, hard sugar candy, honey as desired.	All others.

SAMPLE MEAL PLAN

BREAKFAST

Grape Juice, 1 cup
Chicken Broth, 1 cup
Gelatin, 1/2 cup
Sugar, 1 tsp.
Coffee/Tea, 1 cup

LUNCH

Apple Juice, 1 cup
Beef Broth, 1 cup
Gelatin, 1/2 cup
Sugar, 1 tsp.
Coffee/Tea, 1 cup

DINNER

Cranberry Juice Cocktail,
1 cup
Chicken Broth, 1 cup
Gelatin, 1/2 cup
Sugar, 1 tsp.
Coffee/Tea, 1 cup

SNACK

Ginger Ale, 12 ounces

No Pepper on Tray

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	786		
Protein	14.6	grams	(7%)
Fat	3.4	grams	(4%)
Carbohydrate	177	grams	(90%)

Nutritional supplements suitable for clear liquid diets contain no milk and are low-residue.

Some examples are:

Enlive (Ross)

Resource Fruit Beverage, Nutritious Juice Drinks, Gelatin and Broth Mix (Novartis)

Check other products for current information regarding suitability for a clear liquid diet.

Some low residue products such as Ensure (Ross) and Boost (Mead Johnson) may be acceptable depending on the reason for the clear liquid diet. Check with the physician.

FULL LIQUID DIET

PURPOSE

To provide adequate nourishment in a diet with foods that require no mastication and are liquid at room or body temperature. The foods are free of cellulose and irritating condiments.

NUTRITIONAL ADEQUACY

This diet could be deficient in thiamin and niacin unless sufficient breads, cereals, and vegetables are provided daily. It is deficient in iron for adult women and some age groups. High calorie, high protein supplements may be included on this diet.

DIET PRINCIPLES

This diet is often prescribed between a clear liquid diet and the soft diet for the postoperative patient, for the acutely ill patient, and for the person who cannot chew or swallow solid food. A caffeine restriction may be ordered in conjunction with a full liquid diet for persons with a peptic ulcer disorder, or following a myocardial infarction.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dried Beans, Eggs*, and Cheese (1 or more servings)	Strained meat in soups, 2 or more eggs cooked as in custards or pasteurized eggnogs.	Raw eggs, all others.
Milk, Yogurt, and Cheese (1 1/2 quarts)	May be used as a beverage in milk drinks such as cocoa, eggnog*, milk shake, malted milk and in cooking cream soups.	
Bread, Cereal, Rice, and Pasta (1 or more servings)	Strained cereal, cream of wheat or Farina as gruel-enriched.	All others.
Fruits** (2 or more servings)	Used as juice.	All others.
Vegetables** (3 or more servings)	Used as juice, or strained vegetable in cream soup or mashed white potatoes in cream soups.	All others.
Fats and Oils (2 or more servings)	Cream, fortified margarine, butter, vegetable oil.	All others.
Other (As desired)	Custard, corn starch pudding and ice cream without fruit or nuts, ices, gelatin desserts without fruit, popsicles, sherbet.	All others.

*Salmonella-negative as possible. Egg products may be purchased or milk and egg can be cooked as a soft custard.

**Should include one vitamin C source daily and one vitamin A source 3-4 times weekly from fruit and/or vegetable group.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Beverages and Fluids (As desired)	Carbonated beverages, cocoa, coffee, coffee substitutes, decaffeinated coffee, fruitades, tea, broth.	All others.
Miscellaneous (As desired)	Salt, flavoring extracts, cinnamon, nutmeg.	All others.

SAMPLE MEAL PLAN

BREAKFAST

Orange Juice, 3/4 cup
Oatmeal, 2/3 cup
2% Milk, 1 cup
Margarine, 1 tsp.
Jelly, 1 Tbsp.
Sugar, 1 tsp.
Coffee/Tea, 1 cup

LUNCH

Cream of Mushroom Soup,
(strained), 1 cup
Grape Juice, 1 cup
2% Milk, 1 cup
Milkshake, 1 cup
Coffee/Tea

DINNER

Cream of Chicken Soup,
(strained), 1 cup
Orange/Pineapple Juice, 1 cup
Vanilla Pudding, 1/2 cup
2% Milk, 1 cup
Margarine (in soup), 1 tsp.
Sugar, 2 tsp.
Coffee Creamer, 3 tsp.
Coffee/Tea, 1 cup

SNACK

Milkshake, 1 cup
Apricot Nectar, 1 cup

No Pepper on Tray

This plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2115	
Protein	66 grams	(13%)
Fat	72 grams	(31%)
Carbohydrate	326 grams	(62%)

May alter fat and carbohydrate of meal to increase calories.

REFERENCES:

American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.

DYSPHAGIA DIET

PURPOSE

To provide foods for the patient with an impaired swallow. Dysphagia indicates a disturbance in the normal transfer of food from the oral cavity to the stomach. Patients may have difficulty with one or more of the swallowing phases. A diagnostic swallowing evaluation is necessary to determine the phases of the swallow affected and foods the patient can safely eat. Foods and beverages of a smooth, pudding-like consistency are generally tolerated well and minimize the risk of choking or aspiration. The dysphagia diet and guidelines are meant only as a starting point from which an individual's diet can be planned. Based on the results of the swallowing evaluation the diet should be modified to reflect the patient's food consistency tolerance and individual nutrient requirements.

NUTRITIONAL ADEQUACY

Patients with dysphagia may be unable to consume the quantity of food needed to meet the Recommended Dietary Allowances. This diet could be deficient in thiamin and niacin unless sufficient breads and cereals are provided daily. The recommended amounts of iron will not be met for certain age groups unless iron-rich foods are served frequently. Sufficient fluids must be provided to prevent dehydration. Patients unable to tolerate liquids may need hydration through other means (i.e., nasogastric, gastrostomy tube or I.V.) Thickened nutritional supplements and/or multi-vitamin/mineral may be used as indicated.

DIET PRINCIPLES

Foods should be blenderized to a smooth consistency. Thin liquids are often not tolerated. Results of the swallowing evaluation should be utilized to further identify consistencies of food and beverages appropriate for the patient. See Descriptions of Food Consistency chart.

GENERAL GUIDELINES

1. Liquids as per swallowing evaluation.
2. Don't combine textures in same bolus, for example, cereal and milk, or chunky vegetable soup in broth.
3. Present a wide variety of distinct flavors and temperatures.
4. Don't use straws with patients. Use utensils that are the right size for the patient.
5. Use adaptive equipment as needed, i.e., cutaway cups, rocking knives and high scooped dishes.

FOOD GROUPS

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts (2-3 servings)

RECOMMENDED

Meat, poultry or fish blenderized to a smooth, pudding-like consistency, cheese or meat blended in soup or sauces, pureed scrambled eggs. Combination dishes, casseroles, and stews should be blenderized to a pudding like consistency. See Descriptions of Food Consistencies and Blending Recommendations.

NOT RECOMMENDED

All other meat and meat alternates not blended to appropriate consistency, nuts, peanut butter, refried beans, raw eggs.

*Meat, fish, poultry, eggs, and cheese provide high quality protein. Dry beans and peas, soy extenders, and nuts by themselves are incomplete proteins. Foods containing dry beans, dry peas, or nuts should be combined with grain or animal protein to enhance protein utilization. This group also supplies fat, iron, niacin, and other nutrients.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Milk, Yogurt, and Cheese (2-3 servings)	Cream soup, pudding, custard, yogurt, thick milkshake, blenderized cottage cheese, cheese blenderized into soups or sauces. Whole, 2%, skim, or evaporated milk may be incorporated into the above or thickened to drink. Dry milk may be used in cooking. See Descriptions of Food Consistencies and Blending Recommendations.	See Descriptions of Food Consistencies and Blending Recommendations.
Bread, Cereal, Rice and Pasta (6-11 servings)	Blenderized cooked cereals, saltine crackers, blenderized rice and pasta thickened until cohesive. See Descriptions of Food Consistencies and Blending Recommendations.	All others.
Fruit** (2-4 servings)	All thickened juices, fruits blenderized without thick skins or seeds to smooth, pudding-like consistency. Care must be taken to avoid inappropriate consistencies; i.e., applesauce may be too thin. (½ cup drained solids = ⅓ cup blenderized.) See Descriptions of Food Consistencies and Blending Recommendations.	Raw, cooked, or canned fruits if not blenderized to a smooth, pudding-like consistency. Uncooked dried fruit, fruits with thick skins, seeds or membranes, such as fresh pineapple, grapes, prunes.
Vegetable** (3-5 servings)	All thickened juices, vegetables blenderized without thick skins or seeds to smooth, pudding-like consistency. Care must be taken to avoid inappropriate consistencies, i.e., mashed potatoes too thick. (1/2 cup drained solids = 1/3 cup blenderized).	Raw, cooked, or canned vegetables if not pureed to a smooth, pudding-like consistency. Vegetables with thick skins, seeds, or membranes.
Fats and Oils (Use sparingly)	Margarine, butter, vegetable oil, smooth thickened gravy or salad dressings.	Bacon, fried foods.

**Should include one vitamin C source daily and one vitamin A source 3-4 times weekly from fruit and/or vegetable groups.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Other (Moderate amounts not to exceed caloric requirement)	Includes dessert items such as cake, cobbler, cookies and pies. These dessert items should be blended with liquid/thickener to an appropriate consistency.	Desserts containing coconut, nuts, dried or candied fruit, hard candy, popsicles, icees, plain gelatin, sherbet, or ice cream.
Beverages and Fluids	Any beverage thickened to a smooth consistency. At least 6-8 (eight ounce) glasses/day.	See Descriptions of Food Consistencies and Blending Recommendations.
Miscellaneous (As desired)	Ketchup, mustard, thick sauces, spices, sugar, and other similar condiments.	Coconut.

SAMPLE MEAL PLAN

ALL FOOD AND BEVERAGE BLENDED/THICKENED TO A SMOOTH, PUDDING-LIKE CONSISTENCY

BREAKFAST	LUNCH	DINNER
Orange Juice, 3/4 cup	Tomato Soup, 3/4 cup	Chicken Breast, 3 oz. (baked, no skin)
Oatmeal, 3/4 cup	Roast Beef, 3 oz.	Steamed Potatoes, 1/2 cup
Egg 1	Mashed Potatoes, 1/2 cup	Broccoli, 1/2 cup
Whole Wheat Toast, 2 slices	Gravy, 2 Tbsp.	Roll, 1
Margarine, 2 tsp.	Carrots, 1/2 cup	Margarine, 1 tsp.
Jelly, 2 tsp.	Fruit Cocktail, 1/2 cup	Peaches, 1/2 cup
Sugar, 2 tsp.	Bread, 1 slice	Angel Food Cake, 1 slice
Milk 2%, 1 cup	Sugar, 1 tsp.	Milk 2%, 1 cup
Coffee/Tea	Margarine, 1 tsp.	Sugar, 1 tsp.
	Coffee/Tea	Coffee/Tea
SNACK		
2% Milk, 1/2 cup		
Vanilla Wafers, 6		

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately:

Calories	2292				
Protein	105	grams	(18%)	Dietary Fiber	16 grams
Carbohydrate	289	grams	(50%)	Sodium	2715 milligrams
Total Fat	83	grams	(32%)	Potassium	4188 milligrams
Cholesterol	497	milligrams		Iron	13.5 milligrams

BLENDING RECOMMENDATIONS FOR DYSPHAGIA DIET

COLD LIQUIDS can be thickened to an appropriate consistency by blending them with plain or flavored yogurt, gelatin, or pureed fruit.

Or, a **COMMERCIAL FOOD THICKENER** can be used. There are several available that are flavorless. These thickeners may be used with a variety of foods, including hot liquids such as coffee, or nutritional supplements recommended by the physician or dietitian. (Check product label for diabetic precautions.)

HOT FOODS such as soups, sauces, and gravy, can be thickened by adding pureed meat or vegetables, condensed cream soups, instant mashed potato flakes, or plain yogurt.

CHOPPED AND GROUND MEATS, COTTAGE CHEESE, RICE, AND PASTA are all examples of easy-to-chew foods that can be very difficult to swallow. All those foods can be pureed and used successfully if they are cohesive. A good commercial thickener is frequently advantageous in developing cohesiveness.

MEAT: Generally use 1/4 the amount of liquid to solids for blending. 3 oz. of cooked meat (1/2 cup measure) plus broth, gravy or appropriate sauce yields 1/2 cup pureed meat.

BLENDED FRUITS may be thickened to an appropriate consistency by blending with gelatin or a commercial thickener.

BLENDED VEGETABLES may be combined with mashed potatoes, thickened full liquid soups or a commercial thickener.

SLURRY

The term "slurry", often used for pureed diets, refers to a mixture of commercial thickener dissolved in liquid then poured over solid food items such as cakes, cookies, bread, buns, biscuits, crackers, pancakes, etc. This softens the solid item while keeping it cohesive to help prevent aspiration and provides a visually appealing food item.

REFERENCES:

1. Wood P., *Feeding Guidelines for Dysphagic Patients* (Fact Sheet), Younker Rehabilitation Center, 1200 Pleasant Street, Des Moines, Iowa 50309.
2. Groher ME, *Dysphagia, Diagnosis and Management*, Stoneham, MO, Butterworth Publishers, 1984, p.88.
3. Jernigan AK, *Nutrition in Long Term Care Facilities: A Handbook for Dietitians*, Chicago: American Dietetic Association.

DESCRIPTIONS OF FOOD CONSISTENCIES

EXAMPLES OF THIN LIQUIDS

Apple Juice
 Cranberry Juice
 Grape Juice
 Broth
 Milk, Chocolate Milk
 Coffee
 Tea
 Water
 Soda
 Frozen Juices/Sodas
 Alcohol
 High Calorie Liquid Supplement
 Hot Chocolate
 Frozen Slush
 Frozen Flavored Ices

EXAMPLES OF STICKY OR BULKY FOODS

Fresh White Bread
 Plain Mashed Potatoes
 Peanut Butter
 Bananas
 Refried Beans
 Chunks of Plain Meats
 Bran Cereals

EXAMPLES OF FOODS THAT FALL APART/NON-COHESIVE

Dry Crumbly Breads, Crackers
 Thin Pureed Foods: Applesauce
 Chopped Raw Vegetables/Fruits
 Plain Rice
 Cooked Peas, Corn
 Plain Ground Meats
 Thin Hot Cereals

EXAMPLES OF MEDIUM THICK LIQUIDS

Vegetable Juice
 Blenderized or Cream Soups
 High Calorie Liquid Supplement
 Nectar
 Milkshakes, Malts
 Eggnog
 Powdered Instant Breakfast Drink

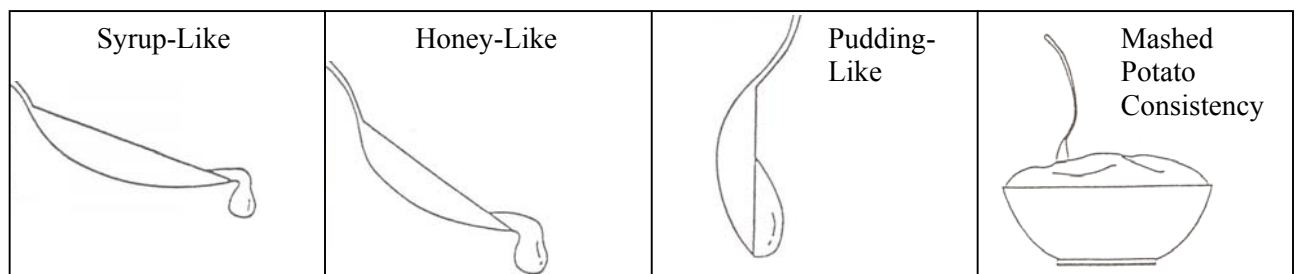
EXAMPLES OF SPOON THICK LIQUIDS

Yogurt
 Pureed Fruit
 Sherbet
 Pudding
 Frozen Shakes
 Gelatin Dessert

EXAMPLES OF SEMISOLIDS THAT FORM COHESIVE BOLUS

Baked Egg Dishes: Souffle,
 Quiches
 Macaroni Salad
 Soft Cheeses
 Canned Fruits
 Ground Meats with Gravy
 Moist, Soft Meat or Fish Loaf
 Custard
 Vegetables in Sauces
 Cheesecake with Sauce
 Pudding, Mousse
 Gelatin that can be consumed
 as a finger food
 Whipped Gelatin
 Hot Cereals

ILLUSTRATIONS OF SERVING CONSISTENCY



REFERENCES:

1. American Dietetic Association. *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. *Missouri Diet Manual*, 8th Edition, 1996.
3. Jennigan, AK, *Nutrition in Long Term Care Facilities: A Handbook for Dietitians*, Chicago, American Dietetic Association.

PUREED DIET

PURPOSE

To provide foods designed for the patient with chewing and/or swallowing problems.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of foods suggested for the normal diet are included every day. The recommended amounts of iron will not be met for certain age groups unless iron-rich foods are served frequently. See Food Pyramid for recommended serving sizes for various age groups.

DIET PRINCIPLES

This is a well-balanced diet modified to provide foods designed for the edentulous patient and patients with swallowing difficulties. To ensure variety in flavor and appetite stimulation, any food prepared for the regular diets that can be modified to become blenderized is included. All foods should be blended with as little liquid as possible. Consistency may be altered to meet the needs of the individual. Patients with swallowing difficulties may respond best when all foods are thinned or thickened to the same consistency. See Descriptions of Food Consistencies chart and illustration of serving consistency. Breads, cakes and cookies may be slurried.

CAUTION: Depending on strength and quality of Food Processor/Blender, some items may not be successfully and/or completely blenderized.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts* (2-3 servings)	Nuts finely ground prior to preparation of product, cooked and blenderized beans and peas. MEAT - Generally use 1/4 the amount of liquid to solids for blending. 3 oz. of cooked meat (1/2 cup measure) plus broth, gravy or appropriate liquid yields 1/2 cup blended meat. Add broth or appropriate liquid for desired consistency. COMBINATION DISHES - Casseroles and stews prepared with regular foods, then blenderized, i.e., pureed meat sauce with pureed spaghetti.	Raw eggs, whole or chopped nuts, peanut butter in natural consistency.
Milk, Yogurt and Cheese (2-3 servings)	Whole, 2%, skim, evaporated, or buttermilk used as a beverage or in cooking, plain yogurt, blenderized yogurt with fruit, blenderized cheese products, and blenderized cream soup.	Yogurt with seeds.

*Meat, fish, poultry, eggs, and cheese provide high quality protein. Dry beans and peas, soy extenders and nuts by themselves are incomplete proteins. Foods containing dry beans, dry peas or nuts should be combined with grain or animal protein to enhance protein utilization. This group also supplies fat, iron, niacin, and other nutrients.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Bread, Cereal, Rice and Pasta (6-11 servings)	BREAD - Blenderized or slurried. All kinds, whole grain or enriched, blenderized or slurried pancakes, French toast, and muffins. CEREALS - Blenderized ready-to-eat cereals with milk, cooked cereals. CEREAL PRODUCTS - Blenderized rice, noodles, macaroni, spaghetti, blended/slurried soda crackers, and graham crackers.	Breads or rolls with seeds Popcorn.
Fruit** (2-4 servings)	Blenderized canned, cooked, or fresh without peelings or seeds and membrane removed (1/2 cup drained solids = 1/3 cup blenderized), all fruit juice.	Peelings, seeds, dried fruits. Strength of blender may not be adequate to blend some fruits, especially those with peelings and/or seeds.
Vegetable** (3-5 servings)	Blenderized canned, cooked vegetables without skins, i.e., potato, blenderized fresh vegetables, i.e., tender lettuce.	Vegetables with peelings and/or seeds.
Fats and Oils (Use sparingly)	Margarine, butter, cream, shortening, salad oil, gravy, and bacon that is blenderized.	None.
Other (Moderate amounts not to exceed caloric requirements)	Cakes and cookies should be slurried or blenderized. Pies and cobblers should be blenderized. Ice cream, sherbet, fruit whips, gelatin, custard puddings may be blenderized if necessary to appropriate consistency.	Desserts containing coconut, seeds, whole or chopped nuts, candied fruit.
Beverages and Fluids (As desired)	At least 6-8 (eight ounce) glasses/day.	None.

**Should include one vitamin C source daily and one vitamin A source 3-4 times weekly from fruit and/or vegetable groups.

FOOD GROUPS

Miscellaneous
(As desired)

RECOMMENDED

Blenderized condiments as tolerated, ketchup, garlic, mint, mustard, olives, parsley, pickles, sauces (cream, gravy, meat sauces), spices, vinegar, and pickle relish.

NOT RECOMMENDED

None.

SAMPLE MEAL PLAN
ALL FOOD SHOULD BE BLENDERIZED OR SLURRIED

BREAKFAST

Orange Juice, 3/4 cup
Oatmeal, 3/4 cup
Egg 1
Whole Wheat Toast, 2 slices
Margarine, 2 tsp.
Jelly, 2 tsp.
Sugar, 2 tsp.
Milk 2%, 1 cup
Coffee/Tea

LUNCH

Tomato Soup, 3/4 cup
Roast Beef, 3 oz.
Mashed Potatoes, 1/2 cup
Gravy, 2 Tbsp.
Carrots, 1/2 cup
Fruit Cocktail, 1/2 cup
Bread, 1 slice
Sugar, 1 tsp.
Margarine, 1 tsp.
Coffee/Tea

DINNER

Chicken Breast, 3 oz.s
(baked, no skin)
Steamed Potatoes, 1/2 cup
Broccoli, 1/2 cup
Roll, 1
Margarine, 1 tsp.
Peaches, 1/2 cup
Angel Food Cake, 1 slice
Milk 2%, 1 cup
Sugar, 1 tsp.
Coffee/tea

SNACK

2% Milk, 1/2 cup
Vanilla Wafers, 6

This plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately:

Calories	2292				
Protein	105	grams	(18%)	Dietary Fiber	16 grams
Carbohydrate	289	grams	(50%)	Sodium	2715 milligrams
Total Fat	83	grams	(32%)	Potassium	4188 milligrams
Cholesterol	497	milligrams		Iron	13.5 milligrams

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. *Missouri Diet Manual*, 8th Edition, 1996.
3. Jennigan, AK, *Nutrition in Long Term Care Facilities: A Handbook for Dietitians*, Chicago: American Dietetic Association.

MODIFIED PUREED DIET

PURPOSE

To provide foods that are easier to chew than the Dental Soft diet but of a more solid consistency than the blenderized/pureed diet.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of foods suggested for the normal diet are included every day. The recommended amounts of iron will not be met for certain age groups unless iron-rich foods are served frequently. See Food Pyramid for the recommended serving sizes for various age groups.

DIET PRINCIPLES

This is a well-balanced diet modified to provide foods that require very little chewing. To ensure variety in flavor and to stimulate the appetite, any food prepared for the regular diets that can be modified to the proper consistency may be included. This diet consists of finely minced or ground foods mixed half and half with pureed foods to a thick consistency. Foods that need to be blenderized should be done with as little additional fluids as possible. Thickeners may be used to thicken foods to meet individual needs. Breads, cakes and cookies may be slurried. See Descriptions of Food Consistencies chart.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts * (2-3 servings)	Finely minced or ground foods mixed half & half with blenderized foods to a thick consistency, soft cheese, peas, beans, ground nuts, peanut butter that is blended with other foods. Combination dishes, casseroles, and stews prepared with regular foods then finely minced or ground and mixed with blenderized foods to a thick consistency.	Raw eggs, whole or chopped nuts, peanut butter in natural consistency.
Milk, Yogurt and Cheese (2-3 servings)	Whole, 2%, skim, evaporated or buttermilk, used as a beverage or in cooking, blenderized yogurt, melted and blenderized cheese products, and blenderized cream soup. Dry milk may be used in cooking.	Yogurt with seeds.

*Meat, fish, poultry, eggs, and cheese provide high quality protein. Dry beans and peas, soy extenders, and nuts by themselves are incomplete proteins. Foods containing dry beans, dry peas, or nuts should be combined with grain or animal protein to enhance protein utilization. This group also supplies fat, iron, niacin, and other nutrients.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Bread, Cereal, Rice and Pasta (6-11 servings)	BREAD - Blenderized or slurried, all kinds, whole grain or enriched, blenderized or slurried pancakes, French toast, and muffins. CEREALS - Blenderized ready-to-eat cereals with milk, cooked cereals. CEREAL PRODUCTS - Blenderized rice, noodles, macaroni, spaghetti, blenderized/slurried soda crackers and graham crackers.	Breads or rolls with seeds Popcorn.
Fruit* (2-4 servings)	Blenderized fruits combined half and half with chopped or mashed fruits to a thick consistency, i.e., bananas, oranges, and grapefruit with membrane removed, canned fruit. (1/2 cup drained solids = 1/3 cup blenderized).	Fresh pineapple, uncooked dried fruit.
Vegetable* (3-5 servings)	Blenderized vegetables combined half and half with chopped or mashed vegetables, i.e., beets, carrots, green beans, asparagus, broccoli, cabbage, tender lettuce, peas, wax beans, cream-style corn, spinach, greens, and potatoes. (1/2 cup drained solids = 1/3 cup blenderized).	
Fats and Oils (Use sparingly)	Margarine, butter, cream, shortening, salad oil, gravy, and bacon that is blenderized.	
Other (Moderate amounts not to exceed caloric requirements)	Blenderized or slurried dessert items such as cake and cookies, blenderized cobbler and pie. Gelatin, sherbet, and puddings may be blenderized. Desserts containing coconut and nuts <u>if</u> blenderized finely.	Desserts containing coconut and nuts if unable to blenderize finely. Dried or candied fruit.
Beverages and Fluids (As desired)	But at least 6-8 (eight ounce) glasses/day.	
Miscellaneous (Condiments as desired and tolerated)	Ketchup, garlic, mint, mustard, parsley, pickles, sauces (cream gravy, and meat), spices, and vinegar.	

*Should include one vitamin C source daily and one vitamin A source 3-4 times weekly from fruit and/or vegetable group.

SAMPLE MEAL PLAN

FOOD SHOULD BE FINELY MINCED OR GROUND AND MIXED 1/2 AND 1/2 WITH PUREED FOODS

BREAKFAST

Orange Juice, 3/4 cup
Oatmeal, 3/4 cup
Egg 1
Whole Wheat Toast, 2 slices
Margarine, 2 tsp.
Jelly, 2 tsp.
Sugar, 2 tsp.
Milk 2%, 1 cup
Coffee/Tea

LUNCH

Tomato Soup, 3/4 cup
Roast Beef, 3 oz.
Mashed Potatoes, 1/2 cup
Gravy, 2 Tbsp.
Carrots, 1/2 cup
Fruit Cocktail, 1/2 cup
Bread, 1 slice
Sugar, 1 tsp.
Margarine, 1 tsp.
Coffee/Tea

DINNER

Chicken Breast, 3 oz.
(baked, no skin)
Steamed Potatoes, 1/2 cup
Broccoli, 1/2 cup
Roll, 1
Margarine, 1 tsp.
Peaches, 1/2 cup
Angel Food Cake, 1 slice
Milk 2%, 1 cup
Sugar, 1 tsp.
Coffee/Tea

SNACK

2% Milk, 1/2 cup
Vanilla Wafers, 6

The plan can be individualized to meet nutritional needs.

This diet as listed in the Sample Meal Plan contains approximately: (% - Percentage of Total Calories)

Calories	2292		
Protein	105	grams (18%)	Dietary Fiber 16 grams
Carbohydrate	289	grams (50%)	Sodium 2715 milligrams
Total Fat	83	grams (32%)	Potassium 4188 milligrams
Cholesterol	497	milligrams	Iron 13.5 milligrams

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. *Missouri Diet Manual*, 8th Edition, 1996.
3. Jennigan, AK, *Nutrition in Long Term Care Facilities: A Handbook for Dietitians*, Chicago, American Dietetic Association.

DENTAL SOFT DIET

PURPOSE

To provide foods for the client who:

1. Eats too rapidly
2. Stuffs their mouth too full
3. Has chewing difficulties due to sore gums, poorly fitting dentures or teeth in poor repair.
4. Has depressed oral-motor function.

NUTRITIONAL ADEQUACY

While this diet may be a transitional diet, it is designed to meet the Recommended Dietary Allowances for all nutrients except iron, which may be deficient in some age groups unless iron-rich foods are served frequently. See Food Pyramid for recommended serving sizes for various age groups.

DIET PRINCIPLES

A transitional diet that emphasizes soft, non-irritating foods during the healing process following dental procedures. Also, a diet for someone with adequate chewing and swallowing capabilities but with the tendency to eat rapidly and/or stuff food.

GENERAL GUIDELINES

1. High-risk foods for choking: unspread peanut butter, dry cookies, cakes, crackers, marshmallows (mini or whole), nuts, popcorn, corn, grapes, hard candy, tootsie rolls, caramels, etc., gum, large pieces of ice.
2. This diet may need to be adapted to meet individual needs. Consult with the dietitian for specific needs.

FOOD GROUP

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts*
(2-3 servings)

RECOMMENDED

Eggs, soft cooked beans and peas, and ground nuts. Peanut butter that is blended with other food.
MEAT - Prepared whole, then minced or ground and moistened, i.e., moistened ground beef.
COMBINATION DISHES - Casseroles and stews prepared from modified recipes in which meats and ingredients are minced or ground prior to cooking, i.e., beef hash.
FISH - Boneless, flaked, usually accompanied by sauce.

NOT RECOMMENDED

Whole, hard cooked eggs, raw eggs, whole and chopped nuts, hard fried meats, peanut butter in natural consistency.

*Meat, fish, poultry, eggs, and cheese provide high quality protein. Dry beans and peas, soy extenders, and nuts by themselves are incomplete proteins. Foods containing dry beans, dry peas, or nuts should be combined with grain or animal protein to enhance protein utilization. This group also supplies fat, iron, niacin, and other nutrients.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Milk, Yogurt and Cheese (2-3 servings)	Whole, 2%, skim, evaporated, and buttermilk used as a beverage or in cooking, yogurt, melted and grated cheese products, and cream soup. Dry milk may be used in cooking.	Sliced cheese, yogurt with seeds.
Bread, Cereal, Rice, and Pasta (6-11 servings)	BREAD - All kinds, whole grain or enriched. French toast, muffins, coffee cake, and similar items all cut into 1-inch squares or smaller, or with liquid to soften. Sandwiches/bread may be cubed, slurried, or served with liquid over it. CEREALS - Cooked, ready- to-eat with milk, includes cereals that add bulk. CEREAL PRODUCTS - Rice, chopped noodles, chopped macaroni, chopped spaghetti, and crackers softened with liquid.	Crusts, if not tolerated; seeds, if not tolerated; whole or chopped nuts.
Fruit* (2-4 servings)	Canned, cooked, or soft ripe fruits. All fruit should be chopped, diced, or mashed.	Uncooked dried fruit, seeds, and peelings; hard crisp fruit, i.e., apples.
Vegetable* (3-5 servings)	Cooked vegetables, diced, chopped, mashed, or without skins.	Raw vegetables, whole kernel corn, hard fried potatoes, and potato skins.
Fats and Oils (Use sparingly)	Margarine, butter, cream, shortening, salad oil, and gravy.	Fried foods.
Other (Moderate amounts not to exceed caloric requirements)	Ice cream without nuts or seeds, sherbet, fruit whips, gelatin, custard, pudding, and tapioca. Cake, cookies, pies, and cobblers chopped or softened with liquid.	Desserts containing coconut, seeds, whole or chopped nuts, candied fruit, potato chips, corn chips, popcorn, and marshmallows.

*Should include one vitamin C source daily and one vitamin A source 3-4 times weekly from fruit and/or vegetable groups.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Beverages and Fluids (As desired)	At least 6-8 (eight ounce) glasses/day.	None.
Miscellaneous (Condiments as desired and tolerated)	Ketchup, garlic, mint, mustard, parsley, sauces (cream, gravy, meat sauces), spices, vinegar, and pickle relish.	Whole or chopped nuts, olives, and pickles.

SAMPLE MEAL PLAN

FOODS ALLOWED SHOULD BE MINCED, GROUND, CUBED, CHOPPED, OR SLURRIED AS INDICATED

BREAKFAST	LUNCH	DINNER
Citrus Juice or Fruit, 3/4 cup Cereal, 1/2 cup Egg 1 Toast, 2 slices cut into 1" pieces Margarine, 2 tsp. Jelly, 1 Tbsp. Sugar, 1 tsp. 2% Milk, 1 cup	Soup or Juice, 1/2 cup Meat, 3 oz. ground or minced, or meat alternate Vegetable, chopped 1/2 cup Gelatin Salad, 1/2 cup Bread, 2 slices cut into 1" pieces Margarine, 1 tsp. Fruit or dessert, 1/2 cup 2% Milk, 1 cup	Meat, Poultry or Fish, 3 oz. chopped or ground, etc. Potato or substitute, 1/2 cup Vegetable, 1/2 cup Gelatin Salad, 1/2 cup Bread, 1 slice cut into 1" pieces Margarine, 1 tsp. Fruit or dessert, 1/2 cup Beverage
SNACK 2% Milk, 1/2 cup Vanilla Wafers, 6		

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately:

Calories	2292		
Protein	105	grams (18%)	Dietary Fiber
Carbohydrate	289	grams (50%)	Sodium
Total Fat	83	grams (32%)	Potassium
Cholesterol	497	milligrams	Iron
			16 grams
			2715 milligrams
			4188 milligrams
			13.5 milligrams

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. *Missouri Diet Manual*, 8th Edition, 1996.
3. Jennigan, AK, *Nutrition in Long Term Care Facilities: A Handbook for Dietitians*, Chicago. American Dietetic Association.

MECHANICAL DIET

PURPOSE

To provide foods that are easy to chew.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of foods suggested for the normal diet are included every day. The recommended amounts of iron will not be met for certain age groups unless iron-rich foods are served frequently. See Food Pyramid for the recommended serving sizes for various age groups.

DIET PRINCIPLES

This is a well-balanced diet modified to provide foods easier to chew. It is used for alert individuals who have chewing difficulty or lack of suitable dentures but are without problems in swallowing. Foods are generally soft-textured but any food that is tolerated may be served. This diet may be adapted to meet individual needs. Consult with your dietitian for specific needs.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts* (2-3 servings)	Cheese, cooked beans, and peas. EGGS: Chopped. MEAT: Prepared whole, bones removed, if not soft textured should be finely chopped or ground and moistened. COMBINATION DISHES: Casseroles and stews prepared from modified recipes in which meats and ingredients are chopped and diced prior to cooking, i.e., beef hash. FISH: Boneless, flaked, or ground, usually accompanied by a sauce on the side.	Raw eggs; whole hard cooked eggs; ribs; whole, tough meats, fish, or poultry; whole or chopped nuts, peanut butter in natural consistency.
Milk, Yogurt and Cheese (2-3 servings)	Whole, 2%, skim, evaporated, or buttermilk used as a beverage or in cooking, yogurt, cheese and cheese products. Dry milk may be used in cooking.	None.

*Meat, fish, poultry, eggs and cheese provide high quality protein. Dry beans and peas, soy extenders, and nuts by themselves, are incomplete proteins. Foods containing dry beans, dry peas, or nuts should be combined with grain or animal protein to enhance protein utilization. This group also supplies fat, iron, niacin, and other nutrients.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Bread, Cereal, Rice and Pasta (6-11 servings)	BREAD: All kinds, whole grain or enriched, toast, French toast, pancakes, muffins, coffee cake, etc. CEREALS: Cooked or ready-to-eat cereals. CEREAL PRODUCTS: Rice, noodles, macaroni, and spaghetti, and crackers.	Breads or rolls with seeds, hard crusts, and popcorn.
Fruit** (2-4 servings)	All fruit juices, and canned fruit Ripe fresh fruit prepared as tolerated with peel and membranes removed--chopped or sliced.	Uncooked dried fruit or seeds.
Vegetable** (3-5 servings)	All tender or well-cooked, finely chopped or shredded fresh vegetables as tolerated. POTATOES: Boiled, mashed, or baked without skins.	Any raw or cooked vegetables difficult to chew. Potato skins or hard fried potatoes.
Fats and Oils (Use sparingly)	Margarine, butter, crisp diced bacon, cream, shortening, salad oil, or gravy.	Hard fried foods.
Other (Moderate amounts not to exceed caloric requirements)	Ice cream without nuts or seeds, sherbets, gelatins, puddings, cakes, cookies, and pies. Flaked coconut in baked products as tolerated.	Whole or chopped nuts, dried or candied fruit, hard icings, popcorn, potato chips, and corn chips.
Beverage and Fluids (As desired)	At least 6-8 (eight ounce) servings per day.	None.
Miscellaneous (As desired)	Condiments, chopped pickles, pitted olives, spices, and vinegar as tolerated.	Whole pickles or olives. All foods listed above.

**Should include one vitamin C source daily and one vitamin A source 3-4 times weekly from fruit and/or vegetable groups.

SAMPLE MEAL PLAN
MODIFY CONSISTENCY AS TOLERATED

BREAKFAST

Orange Juice, 3/4 cup
Oatmeal, 3/4 cup
Egg 1
Whole Wheat Toast, 2 slices
Margarine, 2 tsp.
Jelly, 2 tsp.
Sugar 2 tsp.
Milk 2%, 1 cup
Coffee/Tea

LUNCH

Tomato Soup, 3/4 cup
Roast Beef, 3 oz.
Mashed Potatoes, 1/2 cup
Gravy, 2 Tbsp.
Carrots, 1/2 cup
Fruit Cocktail, 1/2 cup
Bread, 1 slice
Sugar, 1 tsp.
Margarine, 1 tsp.
Coffee/Tea

DINNER

Chicken Breast, 3 oz.
(baked, no skin)
Steamed Potatoes, 1/2 cup
Broccoli, 1/2 cup
Roll, 1
Margarine, 1 tsp.
Peaches, 1/2 cup
Angel Food Cake, 1 slice
Milk 2%, 1 cup
Sugar, 1 tsp.
Coffee/Tea

SNACK

2% Milk, 1/2 cup
Vanilla Wafers, 6

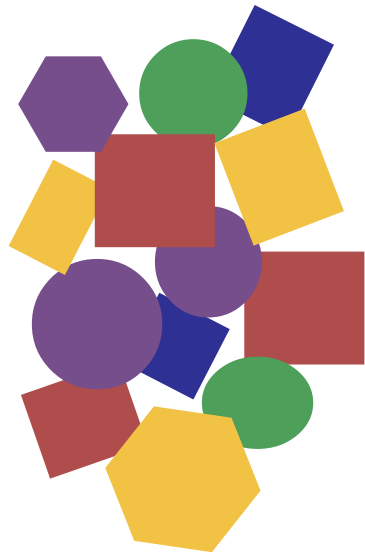
The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2292		
Protein	105 grams	(18%)	Dietary Fiber 16 grams
Carbohydrate	289 grams	(50%)	Sodium 2715 milligrams
Total Fat	83 grams	(32%)	Potassium 4188 milligrams
Cholesterol	497 milligrams		Iron 13.5 milligrams

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. *Missouri Diet Manual*, 8th Edition, 1996.
3. Jennigan, AK, *Nutrition in Long Term Care Facilities: A Handbook for Dietitians*, Chicago, American Dietetic Association.



Modifications For Gastrointestinal Disorders

THE BLAND DIET

Dietary manipulation as a mode of treatment for duodenal or peptic ulcer disease has been overemphasized in the past, and with the advent of drug therapy, appears to be of limited value. At one time a bland diet was felt to promote healing by eliminating foods which either stimulated gastric secretion or irritated the gastrointestinal mucosa. However, studies show that the rate of ulcer healing is unaffected by diet. In addition, no significant differences exist in intragastric pH or acid secretion in patients given a free choice diet versus a restricted bland diet.

Many physicians continue to recommend a bland diet for their ulcer patients. The patient may find symptomatic relief by making minor modification in diet. The diet, however, should be individualized so foods known to cause distress are eliminated.

Caffeine, alcohol, and black pepper have been shown to cause irritation to the gastric mucosa and may cause patient discomfort. Moderate amounts may be tolerated if consumed at or near mealtime. Other spices and condiments appear to be of insignificance.

All foods and beverages, as well as the sight and smell of food, stimulate gastric acid secretion to some degree. Coffee, decaffeinated coffee, and milk have been shown to have similar effects on gastric secretion. Tea, carbonated sodas containing caffeine, and 7-Up are also comparable. Alcohol suppresses gastric secretions. Gastric secretions appear to be unaffected by caffeine content, pH, or osmolality of a food. It appears unwarranted to exclude beverages on the basis alone that they stimulate gastric secretion. (Caffeinated beverages and alcohol, however, may need to be avoided due to their effect upon the gastric mucosa.)

Three normal meals are preferable to frequent multiple feedings. Frequent feedings may increase gastric acidity due to the continual secretory response. Patients with a duodenal ulcer may be affected more so, as they are known to have an exaggerated secretory response to food. Bedtime feedings should be avoided to minimize nocturnal gastric secretion. Administration of medication should be coordinated with meals or snacks to neutralize gastric acidity and provide the greatest benefit to the patient.

Although milk or cream was at one time given frequently throughout the day, this practice is no longer recommended. While milk has an initial neutralizing effect upon gastric acidity, its consumption is followed by a prolonged rise in acid secretion due to its protein and calcium content.

Bland diets are often mistakenly assumed to mean soft foods. Pureed foods or liquids have a lower buffering capacity than solid foods. Foods which require mastication increase salivation, and reduce bile flow and gastric acid secretion. In a limited number of studies, patients who followed a diet high in soluble fiber had lower reoccurrence rates of duodenal ulcers. Additional studies are needed before any dietary recommendations can be made.

GENERAL GUIDELINES

1. Eat three normal meals per day. Avoid bedtime snacks to reduce nocturnal gastric acid secretions.
2. Avoid foods known to cause pain or discomfort. These may include, but are not limited to the following: alcohol; foods containing caffeine (coffee, tea, chocolate, and some carbonated beverages); and black pepper.

ESOPHAGEAL REFLUX

Esophageal reflux refers to the regurgitation of gastric contents back into the esophagus. The dietary guidelines listed, as well as the use of antacids and antisecretory drugs aid in the treatment of gastroesophageal reflux (GER) or any of its complications -- esophageal ulcers, esophagitis, peptic esophageal strictures, and heartburn.

Under normal conditions the esophagus is protected from reflux by the presence of the esophageal sphincter. Certain foods have been shown to lower esophageal sphincter (LES) pressure and increase reflux. These include fatty foods, chocolate, carbonated beverages, alcohol, spearmint, and peppermint. Orange juice, citrus and tomato products can be irritating due to their high acid content. Coffee, both regular and decaffeinated, is permitted according to individual preference and tolerance. Coffee served after a meal is associated with a decrease in LES pressure.

Obesity increases pressure on the stomach; therefore weight control may be of benefit in reducing reflux.

General Guidelines

- 1) Avoid foods known to cause heartburn.
- 2) Eat small, frequent meals. Larger meals may increase gastric pressure and subsequent reflux.
- 3) Avoid foods high in fat.
- 4) Avoid chocolate, alcohol, carbonated beverages, peppermint and spearmint oils. Citrus and tomato products, as well as coffee may cause distress.
- 5) Avoid reclining 1-2 hours after eating.
- 6) Avoid eating 2-3 hours prior to bedtime.
- 7) Avoid tight fitting clothing.
- 8) Maintain ideal body weight.
- 9) Avoid or quit cigarette smoking. Nicotine decreases LES pressure.

SAMPLE MEAL PLAN LUNCH

BREAKFAST

Egg, 1
Toast, 2 slices
Grape Juice, 3/4 cup
Margarine, 1 tsp
Coffee, 1 cup as tolerated
Sugar, Jelly

LUNCH

Vegetable Soup, 1 cup
Roast Beef Sandwich:
Roast Beef, 2 oz.
Bread, 2 slices
Tossed Salad, 1 cup
Low Fat Dressing, 1 Tbsp
Fat Free Mayonnaise,
1 Tbsp
Coffee or Tea, as tolerated,
1 cup

DINNER

Skinless Chicken Breast,
3 1/2 oz.
Baked Potato, 1 medium
Broccoli, 1/2 cup
Dinner Roll, 1 medium
Skim Milk, 1 cup
Margarine, 1 tsp

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately:

Calories	2030		
Protein	103	grams (20%)	Sodium 3088 milligrams
Carbohydrate	298	grams (59%)	Potassium 3872 milligrams
Total Fat	46	grams (20%)	Iron 24 milligrams
Cholesterol	428	milligrams	

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, LK., Arlen, M., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.

POSTGASTRECTOMY DIET

PURPOSE

The purpose of the postgastrectomy diet is to provide adequate calories and nutrients to support tissue healing and to prevent weight loss and dumping syndrome following gastric surgery. This diet is indicated for those persons who undergo a surgical procedure resulting in the inability to regulate normal emptying of the stomach.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of food suggested are included everyday; however, following gastric surgery some patients experience malabsorption. Vitamin/mineral supplementation may be necessary depending on the extent of the surgery and whether symptoms of dumping syndrome persist.

Those individuals unable to consume milk or milk products may need a calcium and vitamin D supplement.

DIET PRINCIPLES

The diet for postgastrectomy decreases the hyperosmotic effect of food by limiting the amount of simple carbohydrates in the diet. Liquids are to be consumed 30-60 minutes after the meal in order to delay the transit time of the food from the stomach to the intestine. Those with dumping syndrome may experience weight loss; therefore additional calories from protein, fat, and complex carbohydrates should be added.

The diet should always be individualized according to each person's specific needs.

Diet Progression After Surgery

1. Ice chips or small sips of water.
2. Clear, unsweetened liquids (i.e., broth, bouillon, unsweetened gelatin, and juices).
3. Postgastrectomy diet advancing to a general diet as tolerated.

DIETARY GUIDELINES

These guidelines should be individualized according to the type of gastric surgery performed, food tolerances, and nutritional problems and deficiencies.

- 1) Do not provide liquids with a meal. Serve liquids 30-60 minutes after meals. Limit liquids to 1/2 - 1 cup servings. Carbonated beverages and milk are not recommended initially. Provide a minimum of 6 cups of fluid daily to replace losses from diarrhea.
- 2) Provide small frequent feedings. Eat slowly and chew food well.
- 3) For weight maintenance choose a diet moderate in fat and protein. Choose complex carbohydrates vs. simple carbohydrates. Use medium chain triglycerides if steatorrhea is present.
- 4) Consume food and drink at moderate temperatures. Cold temperatures can increase gastric motility.
- 5) If "dumping" is a problem, lie down for 30-60 minutes after the meal. This may help to decrease the transit time of the foods consumed into the small bowel.
- 6) Introduce small amounts of milk to determine tolerance. Symptoms of dumping syndrome can be complicated by symptoms of lactose intolerance depending on the extent of the intestinal mucosa resected.

- 7) Pectin, found in fruits and vegetables, may be beneficial in treating dumping syndrome. Pectin delays gastric emptying and slows carbohydrate absorption, therefore reducing the glycemic and insulin response.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u> MAY CAUSE DISTRESS (include these food as tolerated)
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts (2-3 servings)	Lean, tender meats, fish, or poultry. Eggs, peanut butter, dry beans, and peas.	Fried meats, fish, or poultry. Fried eggs.
Milk, Yogurt, and Cheese (2-3 servings)	Milk as tolerated. (May be used as a beverage or in cooking.) Yogurt, cheese, cheese products, and sugar free cocoa.	Chocolate milk, milk shakes, ice cream, ice milk, regular fruited, or frozen yogurt.
Bread, Cereal, Rice, and Pasta (6-11 servings)	Whole grain or enriched breads, cereals, crackers, unsweetened cooked cereals. Enriched rice; barley; noodles; spaghetti; macaroni, and other pastas.	Breads made with dried fruits, nuts, and seeds; donuts, muffins, pastries, coffee cake, and sweet rolls. Presweetened or sugar-coated cereals. Coarse cereals such as bran.
Fruits (2-4 servings)	Fresh fruits, frozen and canned fruits without sugar, unsweetened fruit juice.	Dried fruit. Fruits and juices processed with sugar or syrup. Any fruit or vegetable to which sugar has been added.
Vegetables (3-5 servings)	Cooked vegetables or vegetable juice; raw vegetables as tolerated. Potatoes.	Candied sweet potatoes. Any vegetable to which sugar has been added.
Fats and Oils (use sparingly)	All kinds; butter, margarine, salad dressings, mayonnaise, vegetable oils, sour cream.	
Other (moderate amounts)	Artificially sweetened gelatin, pudding, custard, yogurt, frozen yogurt; plain cakes, and cookies.	All sweets and desserts made with chocolate or dried fruits; sweetened gelatin desserts; and fried pastries.
Beverages and Fluids (as desired)	Coffee, decaffeinated coffee, tea, broth, soups made with allowed ingredients; sugar free fruit drinks, and sugar free carbonated beverages as tolerated.	Carbonated beverages, fruitades, and alcohol.
Miscellaneous (as desired)	Condiments - all kinds; catsup, garlic, coconut, mint, olives, parsley, pickles, mildly flavored sauces and gravies, strongly flavored seasonings as tolerated, vinegar, and artificial sweetener.	(include these food as tolerated) Sugar, honey, candies, jam, jelly, syrup, molasses, and marshmallows.

SAMPLE MEAL PLAN LUNCH

BREAKFAST

Egg, 1
 Toast, 1 slice
 fresh Orange, 1 medium
 Margarine, 1 tsp
 *2 % Milk, 1/2 cup
 *Coffee or Tea, 1/2 cup

LUNCH

Roast Beef Sandwich:
 Roast Beef, 2 oz.
 Bread, 2 slices
 Mayonnaise, 1 tsp
 Apple, 1 medium
 *2% Milk, 1/2 cup
 *Coffee or Tea, 1/2 cup

DINNER

Chicken Breast, 3 1/2 oz
 Mashed Potatoes, 1/2 cup
 Broccoli, 1/2 cup
 Dinner Roll, 1 medium
 Margarine, 2 tsp
 *2% Milk, 1/2 cup
 *Coffee or Tea, 1/2 cup

AM SNACK

Oatmeal, 1/2 cup
 Artificial sweetener
 Margarine, 1 tsp

PM SNACK

Vegetable Soup, 1 cup
 Peanut Butter, 2 Tbsp
 Crackers, 6

SNACK

unsweetened Peaches, 1/2 cup
 Angel Food Cake, 1/12 slice
 *2% Milk, 1/2 cup

*Limit fluids from 1/2 - 1 cup serving and drink them 30-60 minutes after meals.

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	1839			
Protein	104	grams (23%)	Dietary Fiber	19 grams
Carbohydrate	211	grams (46%)	Sodium	2586 milligrams
Total Fat	68	grams (34%)	Potassium	3254 milligrams
Cholesterol	450	milligrams	Iron	13 milligrams

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics* 4th Edition, 1992.
2. Mahan, L. K., Arlen, M., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.

LOW FIBER / LOW RESIDUE DIET

PURPOSE

To provide a nutritionally adequate diet which leaves a minimum of residue in the colon by limiting the amount of fiber. This diet is used for preoperative and postoperative states of lower gastrointestinal surgery or a condition in which decreased fecal bulk is desired such as diverticulitis, ulcerative colitis, Crohn's disease, or any time stenosis of the esophageal or intestinal lumen occurs.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of food suggested are included every day. Potential risks and benefits of long-term restriction of dietary fiber should be addressed. Long-term use of a fiber-restricted diet is associated with constipation, diverticular disease, cancer of the colon, and may aggravate symptoms during nonacute phases of lower gastrointestinal diseases. When symptoms subside or during periods of remission, a normal diet should be instituted.

Restriction of milk and milk products and some fruits may necessitate a calcium, vitamin C, and/or folate supplement.

DIET PRINCIPLES

A low fiber and a low residue diet are not the same. Residue is the portion of the diet which contributes to the content of the feces. Dietary fiber is the portion of food that can not be digested by the human body.

A low fiber diet contains 10-15 grams of fiber per day. This diet is used when there is a need for a reduction in fecal output; when the gastrointestinal tract is blocked; or as a transition from a low residue to a regular diet.

A low residue diet contains approximately 8 grams fiber per day. This diet excludes high fiber foods as well as nonfiber foods that contribute to fecal residue. Foods contributing to fecal residue include: milk, milk products, prune juice, and tough connective tissue of meat. This diet is used during the acute phases of inflammatory bowel disease, diverticulitis, periods of partial bowel obstruction, or before or after bowel surgery.

FOOD GROUPS

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts (2-3 servings)

RECOMMENDED

Meat, fish, poultry, and eggs.

NOT RECOMMENDED

Tough, fibrous meats with gristle*, peanut butter, dried beans, peas, legumes, and lentils.

Milk*, Yogurt, and Cheese (2-3 servings)

Whole, 2%, skim, buttermilk, chocolate, or evaporated; yogurt, cheese, cheese products, cream soup (with allowed vegetables), plain puddings, custard, and ice cream without fruit or nuts.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Breads, Cereal, Rice, and Pasta (6-11 servings)	Refined breads, rolls, biscuits, muffins, crackers; pancakes or waffles; plain pastries; any cooked, refined cereal--farina, cream of rice, grits; ready-to-eat cereals of corn, rice, or white flour. Also includes macaroni, noodles, spaghetti, and rice.	Any breads containing whole-grain flour, bran, seeds, nuts, coconut, or raw or dried fruits. Any whole grain cereals, bran cereal, oatmeal, granola, any cereal containing seeds, nuts, coconut, or dried fruit; graham crackers; barley; brown or wild rice.
Fruit (2-4 servings)	Most canned or cooked fruits without seeds. Cooked or canned peaches, pears, applesauce, baked apples without skin, peeled apricots, white (Royal Anne) cherries, and ripe bananas. All fruit juice except prune juice.	Dried fruit; all berries; most raw fruit. Juice containing pulp. Prune juice.
Vegetables (3-5 servings)	Cooked and canned asparagus, carrots, beets, green and wax beans, squash without skins, V-8 juice, tomato juice, and lettuce as tolerated. Most canned or cooked vegetables without seeds.	Raw vegetables, sauerkraut, winter squash, peas, vegetables with seeds. Juice containing vegetable pulp.
Fats and Oils (use sparingly)	Margarine, butter, vegetable oils, mayonnaise, bacon, plain gravies, and salad dressing without seeds.	
Other (moderate amounts not to exceed caloric requirements)	Sherbet, fruit ices, gelatin desserts, plain cakes and cookies (without nuts, coconut, or glazed fruit), pies (cream or with allowed fruits).	Any containing nuts, coconut, glazed fruits, or fruits not allowed. Candy containing nuts, coconut, glazed fruit or fruits, not allowed, or preserves.
Beverages and Fluids (as desired)	Carbonated beverages, cocoa, coffee, coffee substitutes, decaffeinated coffee, fruitade, tea, and broth.	
Miscellaneous (as desired)	Condiments (all kinds). Catsup, mustard, sauces (cream sauces, gravy, meat sauce), spices (all kinds), vinegar, sugar, honey, jelly, syrup, candy (no nuts, coconut, or lazed fruit), jams (made with allowed fruits), and molasses.	Coconut, olives, pickle relish, popcorn, and pickles.

*These foods are high in residue; assess patient food tolerance and limit as needed. Limit milk and foods containing milk to 2 cups per day as needed. To further reduce residue exclude all fruits, vegetables, and milk products.

Strained fruits, vegetable juices, and white potatoes without skin are allowed.

SAMPLE MEAL PLAN

BREAKFAST

White Toast, 1 slice
Corn or Rice Cereal, 3/4 cup
strained Orange Juice, 3/4
cup
2 % Milk, 1 cup
Margarine, 1 tsp.
Coffee or Tea
Sugar, Jelly

LUNCH OR SUPPER

Chicken Noodle Soup, 1 cup
Roast Beef Sandwich, 2 oz.
Roast Beef
White Bread, 2 slices
Green Beans, 1/2 cup
Applesauce, 1/2 cup
Mayonnaise, 1 tsp.
Coffee or Tea

DINNER

Chicken, 3 oz.
Mashed Potatoes, 1/2 cup
plain Dinner Roll, 1
well cooked Broccoli, 1/2
cup
canned Peaches, 1/2 cup
Angel Food Cake, 1 slice
2% Milk, 1 cup
plain Gravy, 1 tsp.
Margarine, 1 tsp.
Coffee or Tea

SNACK

Vanilla Wafers, 4
Fruit Juice (except Prune), 3/4 cup

This plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2207		
Protein	117 grams (21 %)	Sodium	3468 milligrams
Carbohydrate	292 grams (53%)	Potassium	3552 milligrams
Total Fat	64 grams (26%)	Iron	14 milligrams
Cholesterol	282 milligrams		

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics* 4th Edition, 1992.
2. Mahan, LK., Arlen, M., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.

INCREASED FIBER DIET

PURPOSE

To provide a nutritionally adequate diet with an increased quantity of dietary fiber. Some specific conditions in which a high fiber diet is beneficial in the prevention or treatment of, include: diverticular disease, cancer of the colon, constipation, irritable bowel disease, Crohn's disease, hemorrhoids, hypercholesterolemia, diabetes mellitus, and obesity.

NUTRITIONAL ADEQUACY

This meets the Recommended Dietary Allowances when the types and amounts of food suggested are included every day.

DIET PRINCIPLES

Fiber is found only in plants--fruits, vegetables, grains, nuts, and legumes. Fiber is the part of the plant that cannot be digested by the body. Fiber can be classified as soluble or insoluble. Soluble fiber dissolves in water forming a gel. Soluble fibers play a role in decreasing blood cholesterol levels, and regulating blood glucose levels. Common sources of soluble fiber include: legumes, bran, barley, beans, lentils, peas, apples, oranges, carrots, potatoes, and squash.

Insoluble fiber does not dissolve in water. Insoluble fiber increases the bulk of the food we consume which aids in speeding the passage of food through the digestive system. This may be beneficial in the prevention and treatment of constipation, hemorrhoids, and other intestinal problems. Common sources of insoluble fiber include: whole grains, cereals, bran, most fruits, and vegetables.

It is recommended that adults consume 20-35 grams of dietary fiber per day.

For children and adolescents (age 2-20 years) a safe intake is equal to the "age of the child plus 5 grams of dietary fiber "per day". Age plus 10 grams" may be appropriate for some children and adolescents. "Age plus 10" is the upper limit for dietary fiber intake. "Age +5 to age + 10" = grams dietary fiber per day for children and adolescents.

When planning a high fiber diet use the Food Guide Pyramid as your base. To ensure adequate fiber include 2-4 servings of fruit, 3-5 servings of vegetables, and 6-11 servings of cereal and grains daily.

Consume sufficient liquids when increasing the fiber in your diet. Consume a minimum of eight - 8 ounce glasses daily.

POSSIBLE ADVERSE EFFECTS

Fiber intake should be increased gradually to minimize potential adverse side effects: flatulence, abdominal pain and distention, bloating, and diarrhea.

These effects are temporary and will subside in several days. If these side effects persist, reduce the amount of fiber in your diet and contact your physician.

Studies have indicated that excessive fiber intakes may interfere with the absorption of calcium, magnesium, zinc, copper, iron, and selenium. This is not a problem when following the recommendation of 20-35 grams of dietary fiber daily.

SUGGESTIONS FOR ADDING FIBER TO THE DIET

- 1) Eat a variety of foods. Use the Food Guide Pyramid as your reference.
- 2) Whole-grain breads and cereals, grains, fruits, and vegetables provide the most fiber to the diet. Consume 3-5 servings of vegetables, 2-4 servings of fruits, and 6-11 servings of grains, cereals, pasta, and rice daily.
- 3) Drink plenty of liquids. A minimum of eight - 8 ounce glasses daily.
- 4) Eat more legumes.
- 5) Add legumes, grains, vegetables, and fruits to casseroles, soups, salads, muffins, breads, and other baked goods.
- 6) Eat raw fruits and vegetables; they have more fiber than cooked or canned foods, or juice. The peelings on the fruits and vegetables contribute the fiber. Dried fruits are also good sources of fiber.
- 7) Increase the fiber in meat dishes by adding pinto beans, kidney beans, black eyed peas, bran, or oatmeal.
- 8) For snacking include the following fiber sources: popcorn, whole wheat pretzels, trail mix made with dried fruit, nuts, and seeds; cakes, breads, and cookies made with oatmeal, fruit, and nuts.
- 9) Dairy foods provide little fiber. Increase the fiber by adding fresh fruit, whole grain or bran cereal, nuts, or seeds to yogurt or cottage cheese.
- 10) Read labels. Look for whole-grain or whole-wheat as the first ingredient on cereal and grain packages.
- 11) Gradually increase the fiber in your diet to avoid or lessen possible adverse side effects.

SAMPLE MEAL PLAN

BREAKFAST

Bran muffins, 1 medium
Whole grain cereal, 3/4 cup
Orange, 1 medium
2% Milk, 1 cup
Margarine, 1 tsp
Coffee or tea
Sugar, jelly

LUNCH OR SUPPER

Bean soup, 1 cup
Roast beef Sandwich:
roast beef, 3 oz.
whole grain bread,
2 slices
Salad dressing, 1 Tbsp
Apple, 1 medium
Mayonnaise, 1 Tbsp
Coffee or tea

DINNER

Chicken, 3 1/2 oz.
Baked potato with skin,
1 medium
Whole grain dinner roll,
1 medium
Steamed broccoli, 1/2 cup
Angle food cake, 1 slice
strawberries, 3/4 cup
2 % Milk, 1 cup
Margarine, 2 tsp
Coffee or tea

SNACK

2% Milk, 1/2 cup
Oatmeal Cookies, 2

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2288		
Protein	110 grams (19%)	Potassium	4255 milligrams
Carbohydrate	309 grams (54%)	Iron	13 milligrams
Total Fat	77 grams (30%)		
Cholesterol	232 milligrams		
Dietary Fiber	30 grams		
Sodium	3168 milligrams		

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, L. K., Arlen, J., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.
3. The Sugar Association, Inc., *"Filling Up on Fiber"*, Washington, D.C.
4. Williams, Christine, MD, MPH, *"Importance of Dietary Fiber in Childhood"*, Journal of American Dietetic Association. October 1995, Volume 95, no. 10, pp. 1140-1146.

NUTRITIONAL MANAGEMENT FOR OSTOMY PLACEMENT

PURPOSE:

The purpose of the ostomy nutritional guidelines is to minimize unpleasant odors, flatus, risk of obstruction, and excessive output often associated with ostomy placement.

NUTRITIONAL ADEQUACY:

This diet meets the Recommended Dietary Allowances when the types and amounts of food suggested are included every day; however, the adequacy of the diet depends on:

- 1) the portion of the gastrointestinal tract removed
- 2) the individual's ability to tolerate foods.

Fat soluble vitamins, vitamin B12, and bile salt deficiencies may occur in those individuals having had an ileal resection. The individuals may need fat-soluble vitamin supplements and B12 injections.

A low fat diet and the use of medium-chain triglycerides may be necessary if steatorrhea is a problem.

DIET PRINCIPLES:

Following surgery the diet progresses as follows:

1. Clear liquids
2. Soft, low residue
3. Regular as tolerated. After bowel edema subsides (approximately 6-8 weeks).

General Guidelines:

1. Advance the diet slowly.
2. Eat at regular intervals. 4 to 6 small feedings per day may be better tolerated than 3 meals per day.
3. Pre-existing intolerances should be determined since they might not change after surgery.
4. 6-8 weeks following surgery gradually begin introducing foods high in insoluble fiber.
5. Chew foods well to avoid blockage at the stoma site. Foods associated with stoma obstruction include: raw celery, raw cabbage, nuts, seeds, and foods with kernels.
6. Drink plenty of fluids. 8-10 cups of liquids daily to prevent dehydration and constipation.
7. Maintain a desirable body weight. Avoid excessive weight gain.
8. Avoid foods that produce excessive gas, loose stools, offensive odors, and/or undesirable bulk.

Gas producing foods: beer, broccoli, Brussels sprouts, carbonated beverages, cabbage, cauliflower, cucumber, dry beans, peas, fatty foods, green pepper, highly spiced foods, melon, and milk.

Odor producing foods: asparagus, eggs, cabbage, alcohol, garlic, onions, cheese, fish, and coffee.

Cranberry juice, buttermilk, parsley, and yogurt may reduce odor.

9. If diarrhea occurs, water-insoluble fibers should be eliminated from the diet because they tend to decrease intestinal transit time. Once the diarrhea subsides gradually reintroduce these foods.

SAMPLE MEAL PLAN

BREAKFAST

Oatmeal, 3/4 cup
Unsweetened orange juice,
3/4
White toast, 1 slice
2% Milk, 1 cup
Margarine, 1 tsp
Coffee or tea

LUNCH OR SUPPER

Roast beef sandwich:
roast beef, 3 oz
white bread, 2 slices
Mayonnaise, 1 tsp
Tomato juice, 1/2 cup
Applesauce, 1/2 cup
Tea

DINNER

Chicken breast, 3 1/2 oz
Mashed potatoes, 1/2 cup
Soft cooked green beans,
1/2 cup

AM SNACK

Banana, 1 medium
Graham crackers, 4

PM SNACK

Unsweetened fruit cocktail,
1/2 cup
Vanilla wafers, 4

SNACK

Sliced peaches, 1/2 cup
Angel food cake, 1/12 slice

This plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2060		
Protein	103 grams (20%)	Sodium	2322 milligrams
Carbohydrate	298 grams (56%)	Potassium	4228 milligrams
Total Fat	55 grams (24%)	Iron	14 milligrams
Cholesterol	205 milligrams		
Dietary Fiber	17 grams		

Additional Information:

The National Foundation for Ileitis and Colitis, Inc.
444 Park Avenue S.
New York, NY 10016
(212) 685-3440

United Ostomy Association
36 Executive Park, Suite 120
Irvine, CA 92714
(714) 660-8624

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Lutz, Carroll MA, RN, Pirzejtowski, K.R. MS, RD, *Nutrition and Diet Therapy*. F.A. Davis Company, Philadelphia, PA, 1994.
3. Mahan, LK., Arlen, M., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W. B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.
4. Shield, JoEllen MEd., RD, Mullen, Mary Catherine MS, RD., *Patient Education Materials and Instructional Guide Supplement to the Manual of Clinical Dietetics American Dietetic Association*, Chicago, IL, 1992.
5. Williams, Sue Rodwell, *Nutrition and Diet Therapy*, 7th Edition, Mosby Year Book, Inc., St. Louis, MO, 1993.

GLUTEN-RESTRICTED GLIADIN-FREE DIET

PURPOSE

This diet is designed for the treatment of patients with gluten enteropathy (i.e., nontropical sprue, celiac disease), a malabsorption syndrome caused by sensitivity to gliadin or its products.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of food suggested are included every day.

In severe untreated cases, malabsorption of fat, calcium, magnesium, fat-soluble vitamins, folate, iron, and vitamin B12 can occur. When severe malabsorption or lactose intolerance is present, a lactose restricted diet combined with vitamin/mineral supplements, and medium chain triglycerides may be required.

DIET PRINCIPLES

Gliadin is a protein fraction of the Glycoprotein gluten found in all grains other than rice and corn. Therefore, gluten containing grains are eliminated in this diet. Wheat, rye, oats, barley, buckwheat, malt flavoring, or extracts are used in the manufacture of a variety of foods, beverages and confections, and labels should be checked. Avoid commercial products whose labels use vague terms such as "cereal," "thickening," "starch," "stabilizers," and "fillers."

FOOD GROUP

Meat, Poultry, Fish, Dry Beans,
Eggs, and Nuts
(2-3 servings)

RECOMMENDED

Meats, poultry, fish, eggs, lentils,
dried beans and peas, peanut
butter, soybean and other meat
substitutes, tofu; cold cuts,
frankfurters, or sausage without
fillers.

NOT RECOMMENDED

Breaded or creamed meat, fish,
poultry or eggs; frankfurters,
sausage or luncheon meat
processed with cereal fillers;
canned meat with cereal textured
vegetable protein (TVP) from
wheat, rye, oats or barley; some
tuna processed in vegetable
broth; self-basting turkeys with
TVP or hydrolyzed vegetable
protein (HVP) added. Canned
pork and beans. *

Milk, Yogurt, and Cheese
(2-3 servings)

Whole, 2%, skim,
evaporated, condensed, or
buttermilk, (may be used as
beverage or in cooking). Soy
milk. Yogurt; aged cheese;
cottage cheese; cream cheese;
cream soups (thickened with
allowed flours).

Commercial chocolate milk
with cereal additives; malted
milk; instant milk drinks*; hot
cocoa mixes*; Ovaltine;
cheese foods, cheese spreads,
any cheese product containing
oat gum as a product; canned
cream soup.

*Check product label and contact manufacturer for clarification.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Bread, Cereal, Rice, and Pasta (6-11 servings)	Breads, rolls, and muffins made from allowed flours and starches such as: gluten-free wheat starch, arrowroot, corn, potato, rice, soybean, tapioca; corn or rice cereals containing malt flavoring derived from corn; gluten-free noodles; rice, wild rice; rice cakes; pure corn tortillas.	Cereals and breads made with wheat, rye, barley, buckwheat, kasha, oats, durum, or graham starch; commercial mixes for biscuits, cornbread, muffins, cake mixes, pancakes, or waffles; crackers; zwieback; rusk; rye krisp; pretzels; corn chips; wheat germ, bran, bulgur; millet, triticale; breads made with low gluten flour; cereals made with any malt flavoring or extract; pizza; regular macaroni, noodles, spaghetti; some packaged rice or pasta mixes; any pasta prepared with rye, wheat, oats, or barley flour.
Fruits (2-4 servings)	All fruits and fruit juices.	Thickened or prepared fruits; some fruit pie fillings*.
Vegetables (3-5 servings)	All plain, fresh, frozen, or canned vegetables except those excluded.	Any breaded, creamed, escalloped or au gratin vegetables (unless allowed ingredients are used); canned baked beans*; commercially prepared vegetables and salads in cream or cheese sauce*.
Fats and Oils	Butter, fortified margarine, bacon; homemade salad dressings, pure mayonnaise; and vegetable oils.	Commercial salad dressings*; sour cream; chip and dip mixes; and some non-dairy creamers*.
Other (In moderation, not to exceed caloric requirements)	Desserts made with allowed flours; custard, tapioca, rice, cornstarch pudding; gelatin desserts, ice cream, sherbet, cakes, cookies, pies, pudding, and fruit ice made with allowed ingredients; popcorn, potato chips*; and junket.	Cakes, cookies, pastries, pies, sweet rolls, doughnuts prepared with wheat, rye, oat, or barley. Ice cream cones, ice cream with gluten stabilizers*; bread pudding; commercially prepared puddings, or pudding mixes.

*Check product label and contact manufacturer for clarification.

<u>FOOD GROUP</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Beverages and Fluids (As desired)	Carbonated beverages, fruit drinks; pure instant or ground coffee, decaffeinated coffee, tea; broth; wine, rum, sake, vermouth, cognac, tequila, vodka derived from grapes or potatoes.	Postum; some root beer*; flavored instant coffee; some herbal teas with barley or barley malt; alcoholic beverages distilled from cereal grains--gin, whiskey, vodka, beer, ale, malt liquor; beverage mixes*; instant bouillon cubes and bouillon with HVP*; and commercially prepared soups and mixes.
Miscellaneous (As desired)	Condiments (all kinds). Catsup, coconut, garlic, mint, mustard, nuts, olives, parsley, pickles, spices (all kinds), cider vinegar; cream sauce, and gravy made with allowed flours; hard sugar candy; jelly, jam, marmalade, honey; molasses; preserves; most syrups*; sugar; chocolate, pure cocoa, marshmallows, meringues; and monosodium glutamate (MSG).	Some catsup*, mustard *, soy sauce*, gravy* and meat extracts*; cream or white sauce made with wheat, rye, oats, barley, or buckwheat products; distilled white vinegar; some curry powders*, some dry seasoning mixes*, some chewing gum*, chili sauce*; horseradish *, and steak sauce * .

*Check product label and contact manufacturer for clarification.

Commercially prepared pickles, catsup, mustard, mayonnaise, steak sauce, and other condiments are usually made with distilled grain vinegar; however, the maximum amount of gluten which would be present in such products via the vinegar would be insignificant. Thus, moderate use of the above commercial condiments is recommended.

<u>Ingredient (as appears on product label)*</u>	<u>Foods to Include</u>	<u>Foods to Avoid</u>
Hydrolyzed vegetable protein (HVP) or texturized vegetable protein (TVP)	Soy, corn.	Mixtures of wheat, corn and soya.
Flour or cereal products	Rice flour, corn flour, cornmeal, potato flour, and soy flour.	Wheat, rye, oats, and barley.
Vegetable Protein	Soy and corn.	Wheat, rye, oats, and barley.
Malt or malt flavoring	Those derived from corn.	Those derived from barley or barley malt syrup.
Starch	Arrowroot, corn, potato, tapioca, waxy maize, and maize. When listed on U.S. Manufacturer's ingredient lists, it is cornstarch.	Wheat starch.
Vegetable gum	Carob bean, locust bean, cellulose gum, guar gum, Arabic gum, acacia gum, tragacanth gum, and xanthan gum.	Oat gum.
Soy Sauce, soy sauce solids	Those which do not contain wheat.	Those which contain Wheat.

* Always check the source of the ingredients before eating any product containing them.

Substitutes for wheat flour:

Corn Flour	Potato Starch	Wheat Starch
Corn Meal	Soybean Flour	(gluten-free)
Rice Flour	Tapioca Flour	

When baking with flour other than wheat flour the characteristic of the final product may be altered. Attempts to alter recipes using wheat flour may result in an unsatisfactory product. Special recipes for baked products have been developed using substitute flours.

Substitutions

NOTE: Equivalents of one tablespoon (Tbsp) of wheat flour to be used for thickening sauces, gravies, and puddings:

- 1/2 Tbsp Cornstarch
- 1/2 Tbsp Potato starch flour
- 1/2 Tbsp Arrowroot starch
- 1 Tbsp Rice flour
- 2 tsp Quick-cooking tapioca

NOTE: Equivalents of one cup of wheat flour to be used for cooking; baking:

1 cup wheat starch	5/8 cup (10 Tbsp.) potato flour
1 cup corn flour	7/8 cup (14 Tbsp.) rice flour
1 cup fine cornmeal	1 cup soy flour + 1/4 cup potato starch flour
3/4 cup coarse cornmeal	1/2 cup soy flour + 1/2 cup potato starch flour

SAMPLE MEAL PLAN

BREAKFAST

Rice Krispies, 3/4 cup
gluten free Bread, 2 slices
Orange Juice, 3/4 cup
2% Milk, 1 cup
Margarine, 1 tsp
Coffee or Tea
Sugar, Jelly

LUNCH

Vegetable Soup, 1 cup
Roast Beef Sandwich:
Roast Beef, 2 oz
Corn Tortilla, 2
pure Mayonnaise, 1 tsp
Tossed Salad, 1 cup
pure Oil and Vinegar Dressing,
1 Tbsp
Apple, 1 medium
Coffee or Tea

DINNER

Chicken Breast, 3 1/2 oz
Baked Potato, 1 medium
Broccoli, 1/2 cup
canned Peaches, 1/2 cup
Rice Wafers, 3
Margarine, 2 tsp
2% Milk, 1 cup
Orange Sherbet, 1/2 cup
Coffee or Tea

SNACK

Juice, 3/4 cup
Popcorn, 2 cups

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2200		
Protein	105 grams (19%)	Sodium	2578 milligrams
Carbohydrate	309 grams (56%)	Potassium	4656 milligrams
Total Fat	64 grams (26%)	Iron	19 milligrams
Cholesterol	223 milligrams		
Dietary Fiber	16 grams		

Helpful Hints

1. Read all food labels! Avoid products containing wheat, rye, barley, oats, gluten stabilizers, hydrolyzed or texturized vegetable protein (HVP, TVP).
2. Be aware of how the food is prepared. Flour and cereal products are often used in the preparation of foods.
3. Check with your doctor or pharmacist before taking any medications. Some medications may contain gluten.
4. Use available resources for gluten-free products, cookbooks, and/or support groups.

Support/Resource Groups

The Gluten Intolerance Group of North America
P. O. Box 23053
Seattle, WA 98102-0353
(206) 325-6980

Celiac Sprue Association/United States of America, Inc.
P. O. Box 31700
Omaha, NE 68131-0700
(402) 558-0600

American Celiac Society
45 Gifford Avenue
Jersey City, NJ 07304
(201) 432-2986

National Celiac-Sprue Society
Eleanor McAlester
5 Jeffrey Rd.
Wayland, MA 01778

Midwestern Celiac-Sprue Association
P. O. Box 3554
Des Moines, IA 50322

Midwest Gluten Intolerance Group
5660 Rebecca Lane
Minnetonka, MN 55345

Gluten Intolerance - A Resource Including Recipes
The American Dietetic Association
Publication Dept. - Orders
208 South La Salle Street
Chicago, IL 60604-1003

Gluten Intolerance Recipes
Dept. ARX, Box 307
Coventry, CT 06238

Food Companies with Gluten-Free Products

Dietary Specialties, Inc.
P. O. Box 227
Rochester, NY 14601
(716) 263-2787

Ener-G Foods, Inc.
P. O. Box 84487
5960 1st Ave. S
Seattle, WA 98124-5787
(800) 331-5222 (out-of-state)
(800) 325-9788 (in Washington State)

Kingsmill Food Company, Ltd.
1399 Kennedy Rd., Unit 17
Scarborough, Ontario
Canada M1P 2L6
(416) 755-1124

Red Mill Farms, Inc.
290 S. 5th St.
Brooklyn, NY 11211

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, LK., Arlen, M., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.
3. Nelson, J., *Mayo Clinic Diet Manual, A Handbook of Nutrition Practices*, 7th Edition, Mosby Year Book, Inc., St. Louis, MO, 1994.

RESTRICTED LACTOSE DIET

PURPOSE

This diet reduces the content of the disaccharide lactose found in milk and milk products. It provides an amount of lactose small enough to prevent symptoms of abdominal discomfort in those individuals with a confirmed deficiency of lactase, the enzyme that splits lactose into simple sugars for digestion.

NUTRITIONAL ADEQUACY

If all milk and milk products are eliminated, this diet could be inadequate in calcium, riboflavin, and vitamin D. Use of lactose-hydrolyzed milk and milk products could satisfy these nutrient needs; otherwise a vitamin mineral supplement will be necessary.

DIET PRINCIPLES

- 1) Lactose levels vary widely among individuals; therefore, the lactose restricted diet should be adjusted to individual tolerance levels. Most individuals can tolerate 5-8 grams of lactose (equivalent to 1/2 cup of milk) at a given time, especially if it is consumed with a meal or snack.
- 2) Lactose containing foods or beverages are better tolerated when given in small amounts, throughout the day.
- 3) Lactase enzyme preparations are available commercially (Lactaid™, Lactrase™, or Dairy Ease™). The liquid form of these enzyme preparations must be added to milk 24 hours in advance of ingestion. The enzyme preparations are also available in tablet form, and are consumed prior to eating a lactose containing meal.
- 4) Low lactose products are available in some grocery stores. These may include milk, ice cream, or cottage cheese. Read labels carefully. Lactobacillus acidophilus milk is not better tolerated than regular milk.
- 5) Read labels carefully! Avoid foods which contain the following ingredients: milk, lactose, milk solids, whey, curds, skim milk powder, and skim milk solids.
- 6) Some medicines and vitamin mineral preparations contain small amounts of lactose. The amount of lactose is very small and well tolerated.

FOOD GROUPS

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts
(2-3 servings)

RECOMMENDED

All meats, poultry, fish, and eggs.
Dried beans and peas, nuts, peanut butter, tofu, and tofu products.

NOT RECOMMENDED

Meat, fish, poultry, or eggs that are creamed, breaded, or topped with a cheese or milk-containing sauce.
Frankfurters, sausage, or luncheon meat processed with fillers, whey or dry milk solids; canned meat, fish, or poultry containing milk solids.

Milk, Yogurt, and Cheese
(2- 3 servings)

Buttermilk and yogurt as tolerated; soy milk; hard, aged, and processed cheese as tolerated; lactose treated milk.

Milk, milk drinks; cottage cheese; cheese if not tolerated.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Bread, Cereal, Rice, and Pasta (6-11 servings)	Whole grain or enriched breads, cereals, rice, barley, and pasta made with milk-free ingredients.	Instant cereals made with milk or containing milk solids; waffles, pancakes, bread, biscuits, cereals made with milk; milk solids; or lactose.
Fruits (2-4 servings)	All fruits and fruit juices.	
Vegetables (3-5 servings)	All vegetables and potatoes.	Creamed, scalloped or au gratin vegetables, unless made with treated milk; vegetables prepared with milk or milk products.
Fats and Oils (In moderation)	Butter, margarine; oil based salad dressings; nondairy creamer; all vegetable oils. (In some cases milk-free margarine may be necessary.)	Salad dressings containing milk or cheese; cream; sour cream, whipping cream.
Other (In moderation)	Angel food cake; fruit pies; nondairy toppings; gelatin desserts; sherbets made without milk; icing, cake, cookies, doughnuts made with milk-free ingredients.	Any prepared with untreated milk or milk products.
Beverages and Fluids (As desired)	Coffee, decaffeinated coffee, tea, broth, soups made with allowed ingredients. All milk-free beverages. Carbonated beverages.	Instant drink mixes; cream soups prepared with milk or milk products.
Miscellaneous (As desired)	Condiments (all kinds), catsup, coconut, gravy made with meat drippings, garlic, mint, mustard, marshmallows, olives, parsley, pickles, sauces made with treated milk, spices (all kinds), vinegar, pure sugar candies, honey, jam, jelly, marmalade, molasses, preserves, syrup, sugar.	Gravies made with milk or milk products; chocolate, some cocoas, toffee, peppermint, butterscotch, caramels, artificial sweeteners containing lactose

SAMPLE MEAL PLAN

BREAKFAST

Toast, 1 slice
lactose reduced Milk, 1 cup
Cheerios, 3/4 cup
Orange Juice, 3/4 cup
Margarine, 1 tsp
Coffee or Tea
Jelly, Sugar

LUNCH

Vegetable Soup, 1 cup
Roast Beef Sandwich:
Roast Beef, 3 1/2 oz
Bread, 2 slices
Tossed Salad, 1 cup
Oil and Vinegar Dressing,
1 Tbsp
Apple, 1 medium
Mayonnaise, 1 tsp
Coffee or Tea

DINNER

Chicken Breast, 3 1/2 oz
Baked Potato, 1 medium
Broccoli, 1/2 cup
Dinner Roll, 1 medium
sliced Peaches, 1/2 cup
Angel Food Cake, 1/12 slice
lactose reduced Milk, 1 cup
Margarine, 1 tsp
Coffee or Tea

SNACK

Juice, 3/4 cup
Vanilla Wafers, 4

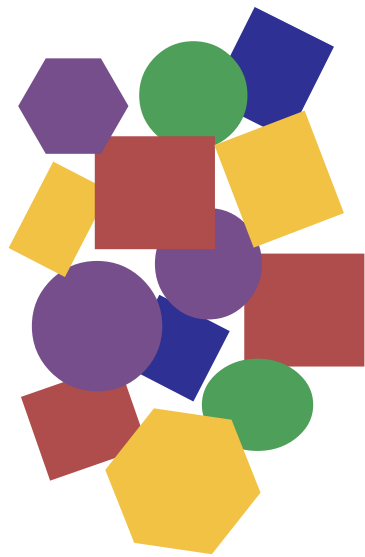
The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2185		
Protein	112 grams (21 %)	Sodium	2707 milligrams
Carbohydrate	287 grams (53%)	Potassium	4424 milligrams
Total Fat	56 grams (23%)	Iron	23 milligrams
Cholesterol	212 milligrams		
Dietary Fiber	19 grams		

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, L.K., Arlen, M., *Krause's Food, Nutrition and Diet Therapy*, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.
3. Nelson, J., *Mayo Clinic Diet Manual A Handbook of Nutrition Practices*, 7th Edition, Mosby Year Book, Inc., St. Louis, MO, 1994.



Modifications In Calories

DIABETES MELLITUS

INTRODUCTION

Diabetes Mellitus is a chronic progressive metabolic disease that often requires lifestyle changes, especially in the areas of nutrition and physical activity.

Medical nutrition therapy (MNT) is an essential component of successful diabetes management. The goal of MNT is to assist persons with diabetes in making self-directed behavior changes that will improve their overall health and the management of their diabetes.¹

Every person with diabetes needs a comprehensive treatment approach including the following:

1. Individualized food/meal plan appropriate for his/her lifestyle and diabetes management goals.
2. Education related to diabetes and nutrition therapy and food/meal planning.
3. Mutually agreed upon short-term and long-term goals for lifestyle changes.
4. Evaluation of lifestyle change outcomes with appropriate recommendation for changes in medication.
5. Ongoing education and nutrition care, with regular review and modification, as necessary, of the meal plan, management goals, and self-management education.¹

OVERALL GOALS

1. Assist in attaining and maintaining optimal metabolic outcomes, including:
 - a. Blood glucose levels in the normal range, to the greatest extent possible. Balance food intake, physical activity, and diabetes medications (when needed) to prevent the complications of diabetes.^{2,3}
 - b. Lipid and lipoprotein profiles that are associated with a decreased risk for cardiovascular disease. Recommended values are shown in Table 1 and Table 2.
 - c. Blood pressure levels that are associated with a decreased risk for vascular disease. Optimal blood pressure for adults with respect to cardiovascular risk is <130/80 mm Hg.⁴
2. Improve health through healthy food choices and physical activity. Nutrition guidelines and nutrient needs are outlined and illustrated in Dietary Guidelines for Americans⁵ and the diabetes version from the American Diabetes Association (ADA) and the American Dietetic Association (ADA), and The First Step in Diabetes Meal Planning.⁶
3. Individualize nutrition care to achieve health-related goals with attention to personal preferences, cultural appropriateness, and the need/willingness to change lifestyle habits.

Table 1⁷

Risk for Macrovascular Disease Based on Lipoprotein Values in Adults with Diabetes			
Risk	LDL Cholesterol Levels	HDL Cholesterol* Levels	Triglyceride Levels
High	≥ 130 mg/dl (3.36 mmol/L)	< 35 mg/dL (0.9 mmol/L)	≥ 400 mg/dL (4.40 mmol/L)
Borderline	100-129 mg/dL (2.59-3.34 mmol/L)	35-45 mg/dL (0.9-1.17 mmol/L)	200-399 mg/dL (2.20-4.39 mmol/L)
Low	< 100 mg/dL (2.59 mmol/L)	>45 mg/dL (1.17 mmol/L)	< 200 mg/dL (2.20 mmol/L)
<p>*For women, the HDL cholesterol values should be increased by 10 mg/dL. The National Cholesterol Education Program (NCEP) Adult Treatment Panel III (JAMA 285:2486-2497) defines HDL cholesterol < 40 mg/dL as high risk and ≥ 60 mg/dL as low risk. Triglycerides < 150 mg/dL are defined as normal and > 200 mg/dL as high.</p>			

Table 2⁸

Recommended Lipoprotein Values for Children and Adolescents			
	Cholesterol Levels	LDL Cholesterol Levels	Triglyceride Levels
Desirable	≤ 170 mg/dL (4.40 mmol/L)	≤ 110 mg/dL (2.85 mmol/L)	Child, 1 st decade ≤ 100 mg/dL (1.13 mmol/L) Child, 2 nd decade ≤ 120 mg/dL (1.35 mmol/L)
Borderline	170 - 199 mg/dL (4.40-5.15 mmol/L)	110-129 mg/dL (2.85-3.34 mmol/dL)	
High	≥ 200 mg/dL (5.17 mmol/L)	≥ 130 mg/dL (3.36 mmol/L)	

GOALS OF DIABETES MEDICAL NUTRITION THERAPY FOR SPECIFIC POPULATIONS AND CONDITIONS

1. Youth with type 1 diabetes: Provide adequate calories and nutrients for attaining and/or maintaining a reasonable weight for adults and normal growth and development rates for children and adolescents.
2. Youth with type 2 diabetes: Recommend changes in lifestyle to decrease the risks associated with diabetes. Achieving and maintaining a healthy weight through healthy eating habits and exercise can delay the progression of diabetes. Changes in eating and exercise habits are important for the entire family.⁹
3. Pregnancy and lactation: Provide adequate calories and nutrients. By monitoring glucose levels, urine ketones, appetite, and weight gain, appropriate nutrient and energy adjustments can be made.
4. Prevention and treatment of acute complications of diabetes treated with insulin or glucose-lowering agents (e.g., hypoglycemia, acute and catabolic illnesses, exercise-related blood glucose problems): Provide adequate nutrition guidelines.
5. Prevention and treatment of chronic complications associated with diabetes (e.g., nephropathy, hypertension, cardiovascular disease, gastropathies, obesity): Provide appropriate nutrition guidelines.
6. Individuals at risk for diabetes: Recommend ways to decrease the risk by improving lifestyle factors. Becoming physically active and maintaining activity¹⁰⁻¹³ or sustained weight loss¹⁴ can prevent or delay the onset of type 2 diabetes.

STRATEGIES FOR ACHIEVING GOALS FOR TYPE 1 DIABETES

1. Individualize the food/meal plan based on the individual's appetite, food preferences, and usual schedule of food intake and activities. Integrate the insulin regimen into usual eating habits.
2. Intensive insulin therapy consisting of background insulin (basal) and pre-meal (bolus) insulin doses or insulin infusion pumps have allowed persons with diabetes more flexibility in timing and frequency of meals, amount of carbohydrate eaten at meals, and timing of physical activity.
3. Fixed doses of insulin, which often consists of injections of rapid-acting or short-acting insulin and NPH insulin before breakfast and the evening meal, requires individuals to eat similar amounts of carbohydrate at consistent times that are synchronized with the time actions of their insulin(s).
4. Consistency in the amount of day-to-day carbohydrate intake is associated with improved blood glucose control.¹⁵ The total amount of carbohydrate, rather than the source, is the first priority. The amount of carbohydrate in the food/meal plan is based on the individual's preferences.
5. With intensive insulin therapy, there is an association of increased body weight with improved glycemic control. Although it is important to try to prevent weight gain, the benefits of improved blood glucose control outweigh concerns about added body weight.¹⁶

STRATEGIES FOR ACHIEVING GOALS FOR TYPE 2 DIABETES

1. Focus on lifestyle changes that can assist in improving and maintaining normal/optimal glucose control, improved lipid profile, and blood pressure control.¹⁷⁻¹⁹
2. Individualize the food/meal plan based on what the person with diabetes chooses to focus on. Examples include:
 - a. Weight reduction: Caloric restriction is a factor in improving glucose control. Glycemic control improves within 24 hours of caloric restriction and before any weight loss occurs. Moderate weight loss of 10 to 20 pounds, regardless of starting weight, has been shown to improve hyperglycemia, dyslipidemia, and hypertension.
 - b. Consistent day-to-day carbohydrate intake at meals and snacks: Individuals need to be provided with basic guidelines for the amount of carbohydrate to eat at meals and/or snacks.
 - c. Reducing Fat Intake: The total amount of dietary fat consumed, regardless of the type is associated with insulin resistance.^{20, 21}
 - d. Increasing physical activity: Physical activity improves insulin sensitivity and enhances cellular glucose uptake by the muscle during or shortly after exercise.²²
 - e. Eating frequency: Due to a slowed first-phase insulin release, spacing meals and distributing food intake throughout the day may be beneficial.^{23, 24}
 - f. Behavior and attitude: Focus on behaviors and attitudes that assist with long-term lifestyle changes.
 - g. Pre-meal and Post-meal blood glucose testing: Use blood glucose testing results to assist the person with diabetes in taking a proactive role in evaluating food choices. Other variables such as stress, physical activity, and illness also affect blood glucose levels and may be the reason, not food, for variations.
3. Lifestyle changes results are evident by 6 weeks to 3 months. Decisions regarding change of nutrition and/or medical therapy should be made at this time.²⁵

NUTRIENT AND FOOD SOURCE GUIDELINES

1. Carbohydrate

- a. The amount of carbohydrate in the diet is individualized based on the person's usual intake and glucose and lipid goals.
- b. Carbohydrate provides 4 kcals per gram.
- c. The 3 types of carbohydrates are: sugars, starch, and fiber. Complex carbohydrates, simple carbohydrates or sugars, and fast acting carbohydrates should not be used because they do not have a specific definition.²⁶
- d. Sugar or sucrose can be used as part of the total carbohydrate in the food plan, not additional carbohydrate, and in the context of an otherwise healthful eating plan per ADA recommendations.^{17,18}
- e. The total carbohydrate content of meals and snacks should be the first priority as many factors affect the glycemic responses to different carbohydrates in persons with diabetes.
- f. Recommendations for fiber intake are the same for persons with diabetes as for the general population.
- g. Nutritive sweeteners are included in the carbohydrate total for meals and/or snacks.
 - i. Sucrose - should be substituted for other carbohydrates in the food plan; high sucrose foods provide energy but little or no nutritional value.
 - ii. Fructose - produces a lower postprandial glucose response than sucrose or starch. However, fructose may have adverse effects on serum lipids.²⁷ There is no reason to recommend that persons with diabetes avoid naturally occurring fructose in fruits, vegetables, and other foods.
 - iii. Sugar alcohols - such as mannitol, sorbitol, xylitol, and starch hydrolysates also produce a lower glucose response than sucrose or glucose and are lower in calories than other sugars (2 kcal/g as compared to 4 kcal/g).²⁸ There is no advantage or disadvantage over sucrose in decreasing the amount of carbohydrates or calories in the diet or in improving overall glucose control. Consuming greater than 10 g per day of some sugar alcohols such as sorbitol or mannitol may cause diarrhea.
- h. Nonnutritive sweeteners available in the United States are acesulfame K, aspartame, sucralose, and saccharin. Cyclamate is also available in Canada. An acceptable daily intake (ADI) level has been established for aspartame, acesulfame K, cyclamate, saccharin, and sucralose. The ADI is defined as the amount of a food additive that can be safely consumed on a daily basis over a person's lifetime without any adverse effects.¹
 - i. The ADI for aspartame is 50 mg/kg of body weight/day.²⁹
 - ii. The ADI for acesulfame K is 15 mg/kg of body weight/day.²⁹
 - iii. The ADI for sucralose is 5 mg/kg of body weight/day.²⁹
 - iv. The World Health Organization's Joint Expert Committee of Food Additives (JECFA) has set an ADI for saccharin of 5 mg/kg body weight/day.²⁹
 - v. Nonnutritive sweeteners are safe to use during pregnancy. Aspartame, acesulfame K, and sucralose have shown no adverse effects on birth weight, mortality, or fetal development.³⁰

2. Protein

The average adult in the United States consumes between 15% and 20% of total daily calories from protein.³¹ Recommendation for protein intake is 10% to 20% of the total daily caloric intake.¹⁷

- a. There is no evidence to suggest a change in usual protein intake. There is limited evidence that protein intake at double the adult Recommended Dietary Allowance (RDA) correlates with the development of nephropathy.³¹
- b. One gram of protein per kilogram of body weight will meet the protein needs of most adults. 1.2 gram of protein per kilogram of body weight will meet the protein needs of most children, adolescents, and athletes.
- c. The rate of protein conversion to glucose in persons with diabetes depends on the degree of diabetes control.
- d. It is unknown whether persons with diabetes can follow a diet high in protein and low in carbohydrate for an extended time. It is also unknown whether weight loss and/or improvements in glucose control are maintained better on these diets in the long-term than with more conventional lower calorie diets.³¹
- e. Reducing protein intake as well as reducing blood pressure with angiotension-converting enzyme (ACE) inhibitors and improving glucose control is the current recommended treatment for nephropathy.
 - i. A protein reduction of 0.8 - 1 g/kg/day is associated with renal improvement. However, maintaining near normal blood sugar control as well as normal blood pressure should be the first priority for persons with microalbuminuria.
 - ii. Lowering protein intake to 0.8 g/kg/day or lower may slow the progression toward end-stage renal disease in persons with clinical nephropathy. Protein status should be closely monitored so that nutritional status is not compromised.^{17,18}
- f. Whether animal and vegetable protein have different effects is currently under investigation.

3. Fat

If 10% to 20% of calories come from protein, the remaining percentages of calories should be distributed between fat and carbohydrate.

- a. Recommendations in the United States are for the majority of people to consume $\leq 30\%$ of daily calories as fat.^{4,17}
- b. Less than 10% of calories should come from saturated fats. Some persons may benefit from decreasing intake of saturated fats to $< 7\%$ of daily calories.⁴
- c. No more than 10% of calories should come from polyunsaturated fats.⁴
- d. Dietary cholesterol intake should be ≤ 300 mg per day.⁴
- e. Improved glucose control, moderate weight loss, reduced alcohol intake, and increased physical activity has all been associated with lowering triglyceride levels.
- f. Higher intakes of total dietary fat in persons with type 2 diabetes has been associated with insulin resistance.²¹
- g. Fat intake should be individualized. Certain people may require longer periods to decrease their fat intake to recommended levels.

4. Calories

Caloric requirements are based on achieving and maintaining a healthy body weight.⁶ People with type 1 diabetes are often thin at diagnosis and need sufficient calories to maintain or even regain lost weight. Persons with type 2 diabetes are often overweight and benefit from a decreased calorie intake to promote safe and effective weight loss. For persons with type 2 diabetes, a loss of 10 to 20 pounds can decrease glucose levels, lipid levels, and blood pressure.⁴

- a. For either weight loss or weight gain, the daily caloric intake goal must be realistic for the person to follow successfully.
- b. For weight loss of approximately 1/2 to 1 pound per week, calorie reduction of 250 to 500 total calories from the person's average daily intake as calculated from a food history, reduction in total fat along with increased physical activity is recommended.⁴
- c. An additional 250 to 500 total calories per day can be added to maintenance calorie needs for weight gain.

Table 3¹

Estimating Maintenance Calories for Adults
Approximate caloric requirements for adults based on actual weight
10 kcal/lb (20 kcal/kg) = kcal for obese or very inactive persons and chronic dieters
13 kcal/lb (25 kcal/kg) = kcal for persons over age 55, active women, and sedentary men
15 kcal/lb (30 kcal/kg) = kcal for active men or very active women
20 kcal/lb (40 kcal/kg) = kcal for very active men or athletes

Table 4¹

Estimating Calorie Requirements for Youth
Base calories on nutrition assessment including food history
Validate calorie needs using one of the following formulas:
<i>Method 1</i>
A. 1000 kcal for 1 st year
B. Add 100 kcal/year up to age 10 years
C. Girls 11 to 15 years old: add 100 kcal or less per year after age 10 years
D. Girls > 15 years old: calculate as an adult
E. Boys 11 to 15 years old: add 200 kcal/year after age 10 years
F. Boys > 15 years old: 23 kcal/lb (50 kcal/kg) very active; 18 kcal/lb (40 kcal/kg) usual; 15 to 16 kcal/lb (30 to 35 kcal/kg) sedentary
<i>Method 2</i>
A. 1000 kcal for 1 st year
B. Add 125 kcal X age for boys; 100 kcal X age for girls; up to 20% more kcal for activity
C. For toddlers 1 to 3 years old: 40 kcal per inch length

5. Alcohol

Alcohol may be used in moderation by persons with diabetes who have well-controlled blood glucose levels. Precautions and guidelines for alcohol use in persons with diabetes include the following.

- a. Moderation is defined as "no more than 1 drink a day for most women and no more than 2 drinks a day for most men."⁷ One alcoholic drink = 1½ oz. distilled liquor, 12 oz beer, or 5 oz wine. The carbohydrate content of mixers used for mixed drinks should be counted.
- b. Persons with diabetes who take insulin and/or oral agents should consume alcohol with food to decrease the risk for hypoglycemia.
- c. Alcohol can also interfere or increase the action of other medications.^{17, 18}
- d. Alcohol provides 7 kcals per gram but provides no nutritional value. Alcohol is not converted to glucose. Excessive amounts of alcohol can potentially be converted to fat. A "rule of thumb" to convert alcohol to exchanges is 1 alcohol equivalent = 2 fats.¹⁷
- e. Alcohol blocks the release of glucose from the liver and interferes with the counter regulation to insulin-induced hypoglycemia.
- f. When alcohol is consumed in moderation and with food, blood glucose levels are not affected by the consumption of moderate amounts of alcohol.³³
- g. Precautions that apply to the use of alcohol with the general public also apply to persons with diabetes. Alcohol should be avoided in persons with a history of alcohol abuse, during pregnancy, and for persons with other medical conditions such as elevated triglycerides, pancreatitis, and advanced neuropathy.

6. Micronutrients

Persons with diabetes are encouraged to obtain their daily vitamin and mineral requirements from a well-balanced diet. Routine supplementation is not recommended unless there is an inadequate dietary consumption or special dietary needs.

- a. Sodium sensitivity is individual; however, people with type 2 diabetes are more sodium sensitive than the general public.³² Moderate sodium intake is recommended. In general, sodium intake should be limited to less than 2400 mg/day.⁷
- b. Persons with diabetes should be instructed on the importance of obtaining daily vitamin and mineral requirements from a well-balanced diet as well as the potential toxicity of megadoses of vitamin and mineral supplementation.
- c. Persons with diabetes who may benefit from vitamin and mineral supplementation include those on very low calorie diets, strict vegetarians, the elderly, pregnant or lactating women, persons with poor glucose control, or persons in critical care environments.³⁴
- d. Deficiency of certain minerals such as potassium, magnesium, and possibly zinc and chromium may aggravate carbohydrate intolerance. Assessments of the need for zinc and chromium has not been established.^{17, 18}
- e. A chromium supplementation benefit in persons with diabetes has not been conclusively demonstrated. Long term benefits from chromium supplementation on glucose and lipid levels is unknown.¹⁸
- f. 1000 mg to 1200 mg of elemental calcium, in older persons with diabetes, appears to be safe and may reduce the incidence of metabolic bone disease. However, the value of calcium supplementation in younger persons is uncertain.³⁵
- g. Because of the uncertainties as to the safety of long-term supplementation, it is advisable to discourage routine supplementation of antioxidant vitamins.^{17, 18}

NUTRITION ASSESSMENT

Certain assessments are needed to develop a comprehensive MNT plan.

1. Data used in nutrition assessment
 - a. Laboratory data
 - i. HbA₁C levels
 - ii. Blood glucose levels (fasting, non-fasting)
 - iii. Cholesterol
 - iv. Triglycerides (fasting)
 - v. Microalbuminuria
 - vi. Home Blood Glucose Monitoring records (when available)
 - b. Blood pressure
 - c. Medical history
 - d. Medications
 - e. Diabetes treatment program
 - f. Medical clearance and/or limitations for exercise
2. Patient parameters to be assessed
 - a. Anthropometric measures (height, weight, etc.)
 - b. Clinical signs
 - c. Food/nutrition history
 - d. Learning style, cultural heritage, religious practices, food-related beliefs, attitudes and concerns, and socioeconomic status
3. Food/nutrition history
 - a. Food history taken by dietitian
 - b. Food records kept by the individual (usually 1 to 3 days)
4. Food plan
 - a. Individualized
 - b. Appropriate to reach blood glucose goals

DIABETES SELF MANAGEMENT TRAINING GUIDELINES

An empowerment (patient-centered) approach to MNT can improve adherence to the treatment plan. Problem solving, adjustment as well as readjustment are all part of successful nutrition therapy.³⁶ The two phases of nutrition self-management training are initial and in-depth self-management training education.

Initial education provides the information needed at the time of diagnosis or at the time of initial contact with a patient. Initial skill topics include beginning strategies for altering eating patterns and basic diabetes nutrition guidelines that are considered basic nutrition survival skills for all persons with diabetes. Basic education tools such as First Step in Diabetes Meal Planning are used to discuss initial changes in eating habits such as making better food choices, spreading carbohydrate containing foods throughout the day, and eating less fat. Initial education may include the following:

1. Learn how to plan meals and snacks based on the principles of the Food Guide Pyramid.
2. Understand food is a source of energy and how food groups affect blood sugar.
3. Consistently eat 3 meals and if necessary, healthful snacks between meals.
4. Distribute starchy foods, fruits, and milk among meals and snacks.
5. Decrease excessive carbohydrate consumption.
6. Learn how to work in occasional sweets and use sugar substitutes.
7. Learn signs, symptoms, treatment, and prevention of high and low blood sugars.
8. Learn when to call physician or diabetes educator for medication adjustment.
9. Learn how to self-monitor blood sugars and keep records.

10. Incorporate exercise guidelines (if appropriate).
11. Learn appropriate snack choices before exercise (if appropriate).
12. Learn guidelines for alcohol use (if appropriate).
13. Learn how to make wise food choices for rotating work shifts (if appropriate).

Outcomes can be assessed by the second or third visit approximately 6 weeks after the initial nutrition visit. Positive outcomes include reduced hemoglobin A₁C, reduced weight, reduced lipids, etc. If progress is not occurring, reassessment is necessary to consider whether revisions to the nutrition plan are needed. The physician or diabetes nurse educator need to be notified that medications need to be added or adjusted if the patient has done all that he/she can or is willing to do and blood glucose is not in the target range. Food records can be helpful in all phases of diabetes self-management training. A food record consists of a patient recording everything they eat, including portion sizes, timing, and circumstances food is eaten over a specified time.¹

In-depth self-management education or follow up is an essential part of MNT. In-depth self-management training includes both diabetes management skills as well as lifestyle changes. Specific topics are based on the patient's choice, lifestyle, knowledge and experience. The in-depth phase of education is on-going. The person with diabetes is taught how to be flexible or how to make adjustments in food planning for a variety of situations.¹ Topics for in-depth or self-management education include:

Diabetes self-management¹

1. Label reading.
2. Food sources of carbohydrate, protein, and fat.
3. Meal planning and insulin adjustments during illness.
4. Meal planning and insulin adjustments with delay or changes in meal time.
5. Meal planning and insulin adjustments with alcohol consumption.
6. Meal planning and insulin adjustments with eating high sugar-containing foods.
7. Meal planning and insulin adjustments with exercise variations.
8. Meal planning and insulin adjustments during travel.
9. Meal planning and insulin adjustments during holidays.
10. Food plan management during short-term illness.
11. Using blood glucose monitoring.
12. Working rotating shifts (if appropriate).

Lifestyle change improvement¹

1. Eating out.
2. Eating school lunches.
3. Grocery shopping.
4. Special occasions.
5. Snack ideas.
6. Recipe modifications, cookbooks.
7. Reducing fat intake.
8. Reducing salt intake.
9. Vegetarian foods.
10. Ethnic foods.
11. Use of convenience and combination food.
12. Use of fat replacers and sugar substitutes.
13. Canning and freezing.

Recommendations for persons with diabetes to receive continuing education and updating of their food plan are:

Adults - Should be seen minimally once a year. Follow up is always recommended for major changes in work schedule, activity level, medication, blood sugar control, or for development of complications.¹

Children - Should be seen minimally every six months. Follow up visits should include calorie adjustment to accommodate growth requirements.¹

FOOD PLANNING APPROACHES

Meal planning is a core component in the treatment plan for people with diabetes. There is no single approach or tool for meal planning for diabetes. Instead, individualization is essential. The nutrition care plan should be based on the nutrition assessment, desired outcomes, and level of self-management skills. Many educational resources are available and different resources may be used for each phase of education. When providing education, adopting a positive attitude can empower patients to make lifestyle changes and take ownership of diabetes care.^{1,37}

It is helpful to review resource options regularly as they are often updated or revised to reflect current diabetes nutrition guidelines. (see Table 5).

Table 5

Resource Options For Diabetes Meal Planning	
Diabetes Meal Planning Resource	Description
Dietary Guidelines for Americans ⁷	Introduction to basic nutrition.
The Food Guide Pyramid ³⁸	Do not address diabetes specific issues.
Guide to Good Eating ³⁹	Pictorial one page handout addressing basic nutrition. Appropriate for lower literacy levels, but a good resource for any reading level. Does not address diabetes specific issues.
The First Step in Diabetes Meal Planning (English and Spanish Versions) ⁴⁰	Basic introduction to diabetes meal planning based on Food Guide Pyramid. Describes diabetes nutrition guidelines and food groups with portion sizes. Can be used for 'survival skills' as well as individualizing the meal plan.
Healthy Food Choices ⁴¹	Provides introduction to good nutrition and simplified exchange lists.
Eating Healthy With Diabetes ⁴²	A simplified version of the Exchange Lists that show every food listed. It can be customized for the client and shows ethnically diverse foods.
Healthy Eating for People with Diabetes ⁴³	Low literacy booklet. Drawings illustrate nutrition concepts. Introduces the Plate Method for portion control.
Exchange Lists for Meal Planning ⁴⁴	Provides lists of foods and portion sizes with approximately the same nutritional value. The exchange lists are used in a meal plan instructing how many exchanges for each food group are to be eaten at meals and snacks. May also be used as resource for carbohydrate counting.
Basic Carbohydrate Counting ⁴⁵	Provides basics of carbohydrate counting. Addresses record keeping and where to find carbohydrate information.
Advanced Carbohydrate Counting ⁴⁶	For patients who have mastered the basics of carbohydrate counting. Teaches patient to use food records to determine insulin to carbohydrate ratios.
My Food Plan (English and Spanish) ⁴⁷ <i>other versions:</i> My Food Plan for Kids & Teens ⁴⁸ My Food Plan for Early Kidney Disease ⁴⁹ My Food Plan Made Easy ⁵⁰ (simplified large print version)	Discusses general guidelines for healthy food choices. Offers a simplified approach to carbohydrate counting and meal planning. Offers space for personalized meal planning.
Single Topic Diabetes Resources ⁵¹	Set of 21 single topic handouts about basic diabetes education topics.
Facilitating Lifestyle Change: A Resource Manual ⁵²	Assists educators to help patients to change eating habits for blood glucose control or weight management.
Idaho Plate Method Meal Planning Guide ⁵³	Illustrates the Idaho Plate Method approach to meal planning and provides sample meals using graphics and photos.

FOOD PLANNING METHODS

1. Food Guide Pyramid³⁸

The Food Guide Pyramid provides a good introduction to the basics of nutrition for people with diabetes. The pyramid describes the food groups and offers portion guidelines and suggested number of servings per day. The shape of the pyramid reinforces the importance of variety and balance in food choices. The Food Guide Pyramid is a good resource to introduce the basics of carbohydrate counting. The carbohydrate food groups (starch, fruit, milk) can be easily identified.³⁸

2. The Plate Method⁵³

The Plate Method is a simple starting point for diabetes meal planning. This is a visual method of promoting healthful eating through the use of pictures, graphs, and food replicas. The education tool is a dinner plate, which serves as a pie chart to show the proportions of foods that should be covered by different food groups.⁵³ For example, the plate may be divided into the following proportions: ½ plate of vegetables, ¼ plate protein, ¼ plate starch, with a serving of fruit and milk on the side. Several techniques from photographs to simple sketches of plates may be used for education. Dietitians may customize the proportions according to the patient's goals. Topics such as fat may be addressed through verbal interaction or print material. Patients who are unwilling or unable to measure food may benefit from this simple approach.⁵⁴

3. Exchange Lists for Meal Planning⁴⁴

The Exchange Lists for Meal Planning offer an organized approach to diabetes meal planning. The Exchange Lists group foods and portion sizes with approximately the same nutritional value (see Table 5). A meal plan specifies how many choices from each food list that a patient should eat at each meal or snack (see Table 7 for instructions on developing a meal plan). Patients refer to the exchange lists to work foods into their meal plan. When teaching the exchange lists, it is helpful to keep in mind that people may be confused by the term “exchange”. Some people have a better understanding of the terms “choice” or “serving”.³⁷ The exchange lists are a logical next step for people who have been using more basic meal planning tools such as the Food Guide Pyramid. And, the exchange lists can provide a good springboard for advanced education involving carbohydrate counting.^{1,37}

Table 6:

Summary of Exchange Values ⁴⁴				
Exchange list/group	Carbohydrate (g)	Protein (g)	Fat (g)	Calories
Carbohydrate Group				
Starch	15	3	1 or less	80
Fruit	15	-	-	60
Milk				
Fat-free	12	8	0-3	90
Reduced-fat	12	8	4	120
Whole	12	8	8	150
Other Carbohydrate	15	varies	varies	varies
Vegetable	5	2		25
Meat and Meat Substitutes Group				
Very Lean	-	7	0-1	35
Lean	-	7	3	55
Medium-fat	-	7	5	75
High-Fat	-	7	8	100
Fat Group	-	-	5	45

Table 7:

Calculating a meal plan using Exchanges⁴⁴	
1.	Assess current food intake and eating pattern using a diet history or food record.
2.	Categorize usual food intake into exchange/choice amounts based on portions and foods consumed at each meal and snack (Refer to Table 1 for a summary of exchange and choice values). Using exchange/choice groups, calculate the total grams of carbohydrate, protein, and fat and translate into energy. (carbohydrate = 4 kcal/gram, protein = 4 kcal/gram, fat = 9 kcal/gram).
3.	Determine the appropriate energy prescription (see Table 3). Subtract energy if weight loss is desired. Generally, 250-500 kcal can be subtracted for a ½-1 pound weight loss per week weight reduction.
4.	Translate the energy prescription into exchanges/choices, staying as close to the current pattern of intake as possible. Calculate the grams of carbohydrate, protein, and fat from the exchanges and determine percentages of energy contributed by each macronutrient: $\% \text{ carbohydrate} = \text{grams carbohydrate} \times 4 / \text{total energy}$ $\% \text{ protein} = \text{grams of protein} \times 4 / \text{total energy}$ $\% \text{ fat} = \text{grams of fat} \times 9 / \text{total energy}$
5.	Adjust exchanges/choices as needed to reach goal percentages for each macronutrient.
6.	Compare usual intake to energy prescription and mutually determine which meal and/or snack to distribute exchange/choice groups.

4. Carbohydrate Counting

Carbohydrate counting is a useful meal planning approach for people with diabetes. The rationale for this technique is that carbohydrate is the main nutrient affecting post-prandial blood glucose levels. While this method emphasizes the importance of total carbohydrate rather than the source, the protein and fat contributions to total energy intake must also be taken into account.³⁷ Healthy eating must continue to be the bottom line. Good candidates for carbohydrate counting are patients who are motivated and knowledgeable regarding the basic concepts of meal planning, carbohydrate contents of certain foods, and blood glucose monitoring.³⁷ Education can be customized according to patient needs.

The carbohydrate counting method divides foods into 3 groups: carbohydrates, meat and meat substitutes, and fat. One carbohydrate serving of “choice” contains 15 grams of total carbohydrate. Vegetables also contain carbohydrates, but in smaller amounts. Starchy vegetables such as peas, corn, and potatoes count as a carbohydrate choice. A free food is any food with less than 20 calories per serving. 3 ounces is the average serving size of meat/fish/poultry. Examples of meat substitutes are 1 oz. cheese, ¼ cup cottage cheese, 1 egg or 2 Tbsp. peanut butter. One fat serving has about 5 grams total fat. Examples are 1 tsp. butter/margarine, oil, or mayonnaise, 1 Tbsp. salad dressing or reduced fat mayonnaise, and 2 Tbsp. of reduced fat salad dressings, cream cheese, or sour cream.¹

In the basic level of carbohydrate counting, initially the focus is carbohydrate consistency. The patient with diabetes and the registered dietitian work together to determine how many grams of carbohydrate or number of choices they should eat at meals or snacks. This is based on the usual carbohydrate intake as determined by a food history or food record.³⁷ Resources such as The Exchange Lists for Meal Planning,⁴⁴ food labels, or a carbohydrate counter reference book are helpful tools to learn about the carbohydrate content of foods.

As patients master this initial level of carbohydrate counting, they can progress to making adjustments in their medication, food, and activities based on patterns from daily records of blood glucose monitoring, food intake, activity level, and medication or insulin. Patients must become skilled at identifying blood glucose patterns, identifying causes, and determining appropriate strategies to achieve blood glucose goals.³⁷

The most advanced level of carbohydrate counting involves using carbohydrate to insulin ratios. This is useful for patients using insulin pump therapy or intensive insulin therapy. The goal is to provide rapid or short acting pre-meal insulin doses to cover the amount of carbohydrate that will be consumed for the meal.¹ Daily records are necessary to determine the correct carbohydrate to insulin ratio. Use of ratios allows for greater flexibility in food choices and portion sizes.³⁷

5. Label Reading^{56,57}

The Nutrition Labeling and Education Act (NLEA) of 1995 provided a standard format for food labels. The Nutrition Facts label contains the following required information:

- ❑ Serving size and servings per container; all of the nutrition information on the Nutrition Facts Panel is based on the serving size.
- ❑ Total calories per serving and total calories from fat per serving.
- ❑ Total fat (g), saturated fat (g), cholesterol (mg), sodium (mg), total carbohydrate (g), dietary fiber (g), sugars (g), and protein (g).
- ❑ Percentage of RDA for vitamin A, vitamin C, calcium and iron.
- ❑ Percent Daily Values for total fat, saturated fat, cholesterol, sodium, total carbohydrate, and dietary fiber based on a 2000 calorie diet.
- ❑ Calories per gram of fat, carbohydrate and protein.

Food labels are also required to show the list of ingredients used to make a food. Ingredients are listed in descending order by weight.

Descriptive terms on food packages or labels must be regulated. Note common food label terms and their meanings below:

Free

fat free	½ g or less fat per serving
sugar free	½ g or less sugar per serving
calorie free	5 calories or less per serving

Low

low fat	3 g or less fat per serving
low calorie	40 calories or less per serving
no sugar added	no sugar added during processing, including ingredients that contain sugar, such as fruit juice

Reduced

reduced or less fat	at least 25% less fat than the regular food
reduced or less sugar	at least 25% less sugar than the regular food
reduced or fewer calories	at least 25% less calories than the regular food
light or lite	1/3 fewer calories or 50% less fat than the regular product

A health claim is a statement on the food label that establishes a relationship between a nutrient and a disease or health-related condition. A food must meet certain nutrient levels to make a health claim. The Food and Drug Administration must approve health claims.

Label reading is helpful in many meal-planning methods. Carbohydrate counting and the exchange lists are two methods where label reading can help patients work foods into the meal plan. One carbohydrate serving is based on the amount of food (starch, fruit, milk, or other carbohydrate) that contains approximately 15 g total carbohydrate. One fat serving is based on the amount of food that contains approximately 5 g fat. One meat or meat substitute serving is based on the amount of food that contains 7 g total protein.¹

SPECIAL CONSIDERATIONS

Dietary Management During Illness

The stress of illness can cause blood glucose levels to increase. Dehydration, hyperglycemia, and ketonuria can occur rapidly. At the onset of illness the person with diabetes should use the following guidelines.

1. Monitor blood glucose more frequently
 - a. Every 2 to 4 hours while glucose levels are elevated and/or until symptoms subside.
 - b. For type 1 diabetes, blood or urine ketones levels also need to be tested if blood glucose level is over 250 mg/dl and/or every 4 hours until negative results are obtained.
2. Maintain adequate hydration.
 - a. Drink at least 8 ounces of fluid every hour while awake (at least 8 to 10 cups of liquid a day).
 - b. If blood glucose is over 250 mg/dl, choose mostly sugar free liquids like water, diet soda, sugar free popsicles®, sugar free gelatin, tea, and broth. Because caffeine acts as a diuretic, the fluids consumed should be caffeine-free. Bouillon, consommé, and canned clear soups provide sodium and electrolytes as well as fluids and should be consumed every 3 hours.
3. If unable to tolerate large amounts of liquids because of nausea and vomiting, use a "sipping diet" of 15 grams of carbohydrate such as Gatorade® taken every 1 to 2 hours.
4. Adjust medications during illness:
 - a. Insulin and/or most oral agents are still needed during illness even when the patient is unable to eat.
 - b. Omission of insulin is a common cause of ketoacidosis.
 - c. If taking metformin and there is a possibility of dehydration, contact physician before continuing medication during illness, as this may trigger lactic acidosis.
5. Consume more easily tolerated carbohydrate beverages or foods equal to the usual carbohydrate in the food plan. In general, 200 gram of carbohydrate per day in evenly divided doses (45-60 grams carbohydrate every 3 to 4 hours) should be sufficient to prevent starvation ketosis along with medication adjustments.^{58,59}
6. The following foods and beverages contain approximately 15 grams of carbohydrate and are appropriate for sick day use.¹
 - 1/2 cup apple juice
 - 1/2 cup regular soft drink (caffeine-free, not diet)
 - 1 Popsicle®
 - 5 Lifesaver® candies
 - 1 slice dry toast
 - 1/2 cup cooked cereal
 - 6 saltines
 - 1/3 cup frozen yogurt
 - 1 cup Gatorade® sports drink (replaces electrolytes)
 - 1/2 cup regular ice cream
 - 1/4 cup sherbet
 - 1/4 cup regular pudding
 - 1/2 cup regular gelatin
 - 1 cup yogurt artificially sweetened or plain (not frozen type)
 - Milkshake (1/3 cup low fat milk and 1/4 cup ice cream)
7. Conditions requiring immediate contact with a health care provider are listed below.¹
 - a. Vomiting more than once.
 - b. Diarrhea more than 5 times or for longer than 6 hours.
 - c. Difficulty breathing.

- d. Blood glucose levels higher than 300 mg/dl on 2 consecutive measurements that are unresponsive to increased insulin and fluids.
- e. Moderate or large urine ketones or blood ketones above 0.6 mmol/L.

Surgery

Following surgery, clear liquid and solid foods should begin as soon as possible. Clear liquids should provide 200 grams of carbohydrate and be spread throughout the day to prevent "starvation ketosis". Liquids included should not be sugar-free. Frequent blood glucose monitoring is recommended to adjust medications or add insulin.⁶⁰

Nutrition Support

For patients requiring nutrition support the total grams of carbohydrate, the amount and the type (i.e., continuous, intermittent or bolus) will impact blood glucose levels. Care must be taken not to overfeed patients because overfeeding can exacerbate hyperglycemia. Caloric needs during catabolic illness are in the range of 25-35 kcal/kg every 24 hours. For patients with normal hepatic and renal function, protein needs range from 1.0-1.5 g/kg body weight depending on the degree of stress.

For tube feedings, either a standard enteral formula (50% carbohydrate) or a lower carbohydrate formula (33-40% carbohydrate) may be used.⁶⁰ It has not been shown that fiber containing formulas significantly affect blood glucose levels. Fiber-containing formulas may be beneficial for patients on long-term enteral feedings to promote bowel regularity and gut mobility.

Regardless of the type of feeding used, blood glucose monitoring is required to guide adjustments in diabetes medication and maintenance of glycemic control.

Older adults

Many older individuals with diabetes live independently or in assisted living or long-term care facilities. Because the risk of malnutrition and hypoglycemia is high it may not be appropriate to aim for tight blood glucose control. The challenge is to provide healthful foods in moderation and still respect the person's choices and quality of life.

Experience has shown long-term care residents generally eat better when provided with a less restrictive diet.⁶⁰ Therefore, it is appropriate to serve residents with diabetes the regular (unrestricted) menus with consistent amounts of meals and snacks. If desserts are served, the portions should be small. A fat restriction is not indicated for the majority of this population because of the risk of malnutrition. Blood glucose monitoring is used to evaluate the nutrition care plan; often it may be more important to make medication changes than food adjustments.

Hypoglycemia

Hypoglycemia is conservatively defined as any blood sugar level below 70 mg/dl. Hypoglycemia should be treated immediately.¹ The following guidelines are recommended in the treatment of hypoglycemia.

1. Eat or drink 10 to 15 grams of carbohydrate-containing foods, beverages, or glucose per se, wait 15 minutes and retest. This method is referred to as the 15/15 rule.
2. If the blood sugar is still low after 15 minutes, repeat even if the symptoms have disappeared.
3. Foods with a higher glucose content should be consumed for a faster glucose response (see Table 8). High fat foods or drinks are poor choices as the fat content slows carbohydrate and takes longer to raise blood glucose levels (See table 9).

4. If it is longer than 60 minutes until the next scheduled meal or snack, caution should be taken as blood glucose may fall again if food is not eaten within the next hour. Blood glucose level should be tested again and treated if low.¹

Table 8¹

Carbohydrate Sources for Treatment of Hypoglycemia (15 to 20 g carbohydrate)	
Source	Quantity
Glucose tablets	3 to 4
Lifesaver® candies	8 to 10
Brach's® hard candies	8 to 10
Raisins	2 tablespoons
Non-diet soft drinks	4 to 6 oz
Fruit juice	4 to 6 oz
Milk (none fat or low fat)	8 oz

Table 9¹

High Fat Content Foods that are Poor Choices for Treating Hypoglycemia	
Ice cream	Nuts
Doughnuts	Cookie dough
Candy bars	Pizza
Meat	French Fries
Pie	Milkshakes
Cake	Potato chips

People who intensively control blood glucose may have hypoglycemia episodes more often and unintentional weight gain may occur with frequent treatment. Common causes of hypoglycemic episodes include too much insulin or insulin secretagogues (sulfonylureas), delayed or decreased usual food intake, extra physical activity, or exercise and/or alcohol consumption.

More than 50% of all hypoglycemic episodes occur during the night. **Nocturnal hypoglycemia** is often caused by exercise during the previous day or failure to eat a bedtime snack.¹ If a low blood sugar is suspected during the night it may be necessary to test blood glucose between 1 a.m. and 3 a.m. Evening insulin may need to be decreased or the evening bedtime snack increased. Frequent episodes of severe hypoglycemia need to be discussed with health care team members.

Exercise

Regular exercise and physical activity is an important component of the prevention, as well as, the management of type 2 diabetes. For people with type 1 diabetes, the emphasis must be on adjusting the therapeutic regime to allow for safe participation in all forms of physical activity that an individual desires.

Exercise and Type 1 Diabetes

People with type 1 diabetes who are in good metabolic control and without complications can participate in all levels of physical activity. Some adjustment in the therapeutic regime may be necessary to insure that activities can be performed safely. Listed below are general guidelines that may prove helpful.

1. Avoid physical activity if fasting blood glucose levels are ≥ 250 mg/dl and ketosis is present.
2. Use caution if glucose levels are ≥ 300 mg/dl and no ketones are present.

3. Ingest added carbohydrate if glucose levels are ≤ 100 mg/dl.
4. Monitor blood glucose levels before and after physical activity to make the necessary changes in insulin or food.
5. Learn the glycemic response to different physical activities.
6. Keep carbohydrate-based foods available during and after physical activity and consume as needed. (see table 10⁶¹).

Table 10⁶¹

General Guidelines for Food Adjustments for Exercise*			
Types of Exercise and Examples	If Blood Glucose is:	Increase Food Intake by:	Food Suggestions
Exercise of short duration and of low to moderate intensity (walking a 1/2 mile or leisurely bicycling for < 30 minutes)	< 100 mg/dl	10 - 15 g carbohydrate/hour	1 fruit or 1 starch exchange
	100 mg/dl or above	Not necessary to increase food	
Exercise of moderate intensity (1 hour of tennis, swimming, jogging, leisurely bicycling, golfing, etc)	< 100 mg/dl	25 - 50 g carbohydrate before exercise, then 10 -15 g/hour of exercise	1/2 meat sandwich with a milk or fruit exchange
	100 -180 mg/dl	10 - 15 g carbohydrate	1 fruit or 1 starch exchange
	> 181 mg/dl	Not necessary to increase food	
	≥ 300 mg/dl (especially with ketosis)	Do not begin exercise until blood glucose is under better control	
Strenuous activity or exercise (about 1-2 hours of football, hockey, racquetball, or basketball games; strenuous bicycling or swimming; shoveling heavy snow)	< 100 mg/dl	50 g carbohydrate, monitor blood glucose carefully	1 meat sandwich (2 slices of bread) with a milk and fruit exchange
	100 -180 mg/dl	25-50 g carbohydrate, depending on intensity and duration	1/2 meat sandwich with a milk or fruit exchange
	> 181 mg/dl	10 - 15 g carbohydrate	1 fruit or 1 starch exchange
	≥ 300 mg/dl (especially with ketosis)	Do not begin exercise until blood glucose is under better control	
*For persons on insulin and/or insulin secretagogues (sulfonylureas) not wishing to lower weight. If weight loss is desired, downward adjustment of insulin and/or insulin secretagogues (sulfonylureas) would be more appropriate than increasing food intake to prevent low blood sugar during exercise. The person on insulin and/or insulin secretagogues (sulfonylureas) should always carry a form of fast-acting sugar, particularly when exercising.			

Exercise and Type 2 Diabetes

The possible benefits of physical activity for the person with type 2 diabetes are substantial. The benefit of improving the metabolic abnormalities of type 2 diabetes is the greatest when it is used early in its progression beginning with insulin resistance.

Before beginning any physical activity program, the individual should be screened thoroughly. A careful medical history and physical examination should focus on the symptoms and signs of disease affecting the heart and blood vessels, eyes, kidneys, feet, and nervous system.

Standard exercise recommendations for persons with diabetes include:⁶²

1. Warm-up and cool-down period.
2. Gentle stretching exercise for 5 to 10 minutes.
3. Aerobic physical activity.
4. Appropriate attention to the feet, (i.e. Silica gel or air midsoles, polypropylene, coolmax, or ultramax blend socks), and proper footwear.
5. Diabetes identification, i.e. bracelet, necklace, watch.
6. Adequate hydration prior to and during activity.
7. Moderate weight training program with high repetitions.

Pregnancy

Preconception counseling is important for all women, but especially women with diabetes. Ideally the glucose levels will be as close to normal as possible before conception with fasting blood glucose of 60 - 90 mg/dl and 1 hour post meal values of < 140 mg/dl. HbA_{1c} should be ≤ 100% of normal to prevent congenital anomalies and spontaneous abortion.⁶³

Folic acid supplements of 400 - 1000 mEq/day should be started at least one month prior to conception and continued throughout the pregnancy to reduce the risk of neural tube defects.⁶⁴

Risk assessment for gestational diabetes should be undertaken at the first prenatal visit. Women with high risk conditions (marked obesity, personal history of gestational diabetes, glycosuria, or a strong family history of diabetes) should undergo glucose testing as soon as possible. If they are not found to have gestational diabetes at the initial screening they should be tested at 24 - 28 weeks of gestation. Women of average risk should be evaluated for gestational diabetes at 24 - 28 weeks of gestation.

Guidelines for screening and diagnosis of gestational diabetes are shown in Table 11.⁶⁴

Table 11 ⁶⁴

Diagnosis of Gestational Diabetes with a 100-g or 75-g Oral Glucose Load		
Time (hours)	100-g Oral Glucose Load	75-g Oral Glucose Load
Fasting	95 mg/dl	95 mg/dl
1	180 mg/dl	180 mg/dl
2	155 mg/dl	155 mg/dl
3	140 mg/dl	
* Two or more of the venous plasma concentrations must be met or exceeded for a positive diagnosis.		

The treatment goal for gestational diabetes is to normalize blood glucose levels through diet, physical activity, and insulin therapy, if necessary. Oral hypoglycemic agents are not recommended during pregnancy until further testing is conducted.⁶⁰

Frequent blood glucose monitoring is recommended during pregnancy for pre-existing diabetes as well as gestational diabetes. Home blood glucose monitoring is usually, but not confined to, fasting and 1 or 2 hour postprandial testing. (see Table 12 for glucose goals during pregnancy).

Table 12⁶³

Glucose Goals During Pregnancy	
Time	Insulin Therapy - recommended when medical nutrition therapy fails to maintain self-monitored glucose at the below-specified levels.
Fasting	Whole blood glucose < 95 mg/dl Plasma glucose < 105 mg/dl
1 hour postprandial	Whole blood glucose < 140 mg/dl Plasma glucose < 155 mg/dl
2 hour postprandial	Whole blood glucose < 120 mg/dl Plasma glucose < 130 mg/dl

Pre-breakfast urine ketone measurements should be taken if women are following a hypocaloric or carbohydrate restricted diets.⁶³

Energy and Protein Requirements

A thorough nutrition assessment, including usual food intake, is important in individualizing the caloric level of the food plan. The goal is to provide adequate energy to ensure a nutritionally adequate diet, appropriate weight gain, and prevent hyperglycemia or ketonuria.

The recommended weight gain for pregnant women with preexisting or gestational diabetes is the same as for women without diabetes. Weight gain goals are based on pre-pregnancy body mass index. (see Table 13 for guidelines for prenatal weight gain).

Table 13

Guidelines for Prenatal Weight Gain		
	Recommended wt gain	Recommended wt gain per week after 12 weeks
BMI (Body Mass Index) BMI < 19.8	12.5 to 18 kg (28 - 40 lb.)	0.5 kg (~1 lb.)
BMI 19.8 - 26	11.5 to 16 kg (25 - 35 lb.)	0.4 kg
BMI > 26 to 29	7 to 11.5 kg (15 - 25 lb.)	0.3 kg
BMI > 29	At least 7.0 kg (15 lb.)	
Other: Twin pregnancy	15.9 - 20.4 kg (34 - 45 lb.)	0.7 kg
Triplet pregnancy	Overall gain of 22.7 kg (50 lb.)	

During the 1st trimester, unless the woman is underweight, additional energy is not needed. An additional 300 calories is needed per day during the 2nd and 3rd trimester. Energy requirements are based on pre-pregnancy body weight. An additional 10g of protein is recommended over and above the RDA of 0.8 g/kg.

Food Planning

Smaller frequent meals with between meal snacks are recommended. For women on insulin, the bedtime snack is very important in preventing overnight hypoglycemia and fasting ketosis. For some women with gestational diabetes, carbohydrate is generally less well tolerated at breakfast than at other meals due to the overnight action of cortisol and growth hormone. Carbohydrate may be restricted to 15 - 30 grams at

breakfast to control blood glucose. Total carbohydrate intake of 40% to 45% is beneficial in controlling blood glucose.

Other Nutrient Concerns During Pregnancy

Adequate intake of calcium, folate, and iron are also of concern during pregnancy.

1. Pregnant women require 1200 mg/day of calcium.
2. The need for iron doubles in the 2nd and 3rd trimester for a total of 30 mg/day.
3. Folate requirements double during pregnancy from 180 meq to 400 meq/day.
4. Saccharin can cross the placenta but there is no evidence that this is harmful to the fetus.⁶⁴
5. Aspartame is safe for pregnancy except for women with phenylketonuria.⁶⁴
6. Acesulfame K crosses the placenta. Reproduction studies show no adverse effect; therefore, it can be used safely during pregnancy.⁶⁴
7. In general, high-intensity sweeteners can be consumed during pregnancy.⁶⁴

Blood glucose returns to normal after delivery in 97% of all women with gestational diabetes.⁶³ Because these women are at high risk for developing type 2 diabetes later in life, it is important to achieve and maintain a healthy body weight and active lifestyle.

MONITORING

Blood Glucose Monitoring

Self-monitoring of blood glucose (SMBG) is an important component of diabetes management. SMBG provides feedback for the following:

1. Achieving and maintaining specific glycemic goals.
2. Preventing and detecting hypoglycemia.
3. Adjusting care in response to lifestyle changes.
4. Determining the need for insulin therapy in gestational diabetes mellitus.
5. Evaluating the glycemic response to physical activity and type or amounts of foods.⁶⁵

Frequency of testing may vary between individuals. Factors such as type of diabetes, type of medications, level of activity, and lifestyle factors including finances and occupation must be considered. When a person is being treated with insulin, more frequent testing is recommended. If a person is using rapid-acting insulin such as Lispro, 2-hour postprandial testing is recommended. For persons on oral hypoglycemic agents, testing may be recommend 1 - 4 times per day.

When a person's diabetes is diet-controlled, it is important to monitor to determine how food choices affect blood glucose levels. Recommend testing may vary from 1 - 4 times per day, as necessary, until patterns of blood glucose control are established. Some circumstances may warrant more frequent monitoring, examples being: pregnancy, very young age, exercise, illness, stress, change in diabetes medication, or anytime when blood sugar control is unknown. As good blood glucose control is established, frequency of monitoring may be decreased.³⁷ (see Table 14 for potential causes of low and high blood sugars and suggested solutions for correcting these problems).

Table 14 ⁶⁶

Potential Causes and Solutions for Dealing With High and Low Blood Sugars		
Problem	Potential Cause	Potential Solutions
High fasting glucose	Insulin resistance (also associated with puberty hormone changes;) insufficient insulin available overnight; rebound hyperglycemia overnight (Somogyi effect); dawn phenomenon.	Adjust PM or HS intermediate acting or long-acting insulin dose or time; adjust OHA dose or time; adjust type of OHA; add or increase HS activity; lose weight to reduce insulin resistance.
High glucose after breakfast	Inadequate insulin produced or injected to cover breakfast; peak insulin action not at appropriate time.	Adjust time or dose of short-acting AM insulin; adjust OHA time or dose; adjust type of OHA; decrease size of breakfast; adjust amount of breakfast carbohydrate; adjust glycemic index of breakfast carbohydrate or divide breakfast into 2 smaller morning meals.
Insulin reactions (hypoglycemia) before lunch	Excessive AM short-acting insulin for breakfast carbohydrate; peak insulin action not at appropriate time.	Adjust time, type, or dose of AM short-acting insulin; adjust type or dosage of OHA; add/or increase morning snack or increase breakfast.
Insulin reactions (hypoglycemia) in afternoon	Excessive AM intermediate-acting insulin; excessive lunch time short-acting insulin; excessive OHA dosage.	Adjust time, type, or dose of AM intermediate-acting insulin; adjust time, type or dose of lunch-time insulin; adjust OHA type or dosage; add or increase afternoon snack or increase lunch.
High glucose in afternoon	Inadequate insulin produced; intermediate-acting AM insulin insufficient; short-acting lunch-time insulin insufficient; OHA dosage insufficient or excessive snack or lunch.	Adjust time or dose of AM intermediate-acting insulin; adjust time, dose, or type of short-acting lunch-time insulin; adjust type or dosage of OHA; decrease or omit afternoon snack or decrease lunch carbohydrate.
High glucose at night after evening meal	Inadequate insulin produced; insulin insufficient to cover dinner; inadequate OHA dosage or evening meal too large.	Adjust time, dose, or type of PM insulin; adjust time, dose, or type of OHA or decrease dinner carbohydrate.
Insulin reactions (hypoglycemia) at night	Excessive amount of insulin; inappropriate time of insulin peak; excessive action of OHA or insufficient dinner meal or evening snack.	Adjust time, type, or dose of bedtime insulin; adjust time, type or dose of OHA; increase dinner and/or snack carbohydrate.

AM-Morning

PM-Afternoon

HS-Bedtime

OHS-Oral Hypoglycemic Agent

Hemoglobin A1c (HbA1c)

HbA1c (also referred to as glycosylated or glycated hemoglobin) is the most abundant minor hemoglobin component in the red blood cell, increasing in proportion to the blood glucose level over the proceeding three to four months in persons with diabetes. The HbA1c value, like regular self-monitoring of blood glucose, provides another marker of metabolic control. HbA1c has been used as a predictor of the risk of long-term complications of diabetes. It is mostly commonly recommended to monitor HbA1c levels every three months, depending on blood glucose control. (see Table 15 for Glycemic target values).

Table 15

Glycemic Targets for Non Pregnant Individuals with Diabetes¹			
Biochemical Index	Nondiabetic Reference Range	Goal	Suggested Action Range
HbA1c, %	4.0 to 6.0	<7.0	>8.0

REFERENCES:

1. Franz, MJ, et al. A Core Curriculum for Diabetes Educators. Diabetes Management Therapies. 4th Edition. 2001.
2. Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med. 1993; 329:977-986.
3. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet. 1998; 352:837-853.
4. American Diabetes Association. Standards of medical care for patients with diabetes mellitus (position statement). Diabetes Care. 2001; 24 (suppl 1):S33-S43
5. US Department of Agriculture and US Department of Health and Human Services. Nutrition and Your Health: Dietary Guidelines for Americans 2000, 5th Edition. Hyattsville, Md: USDA Human Nutrition Information Service; 2000. Home and Garden Bulletin
6. Krauss RM, Eckel RH, Howard B, et al. AHA dietary guidelines. Revision 2000: A statement for healthcare professionals from the Nutrition Committee of the American Heart Association. Circulation. 2000; 102:2284-2299.
7. American Diabetes Association. Management of dyslipidemia in adults with diabetes (position statement). Diabetes Care. 2001; 24 (suppl 1):S58-S61.
8. The Expert Panel on Blood Cholesterol Levels in Children and Adolescents. Report of the Expert Panel on Blood Cholesterol Levels in Children and Adolescents. Pediatrics. 1992; 89 (suppl):525-584.
9. American Diabetes Association. Type 2 diabetes in children and adolescents (consensus statement). Diabetes Care. 2000; 23:381-389.

10. Helmrigh SP, Ragland DR, Leung RW, Paffenbarger RS. Physical activity and reduced occurrence of non-insulin dependent diabetes mellitus. N Eng J Med. 1991; 325:147-152.
11. Manson JE, Rimm EB, Stampfer MJ, et al. Physical activity and incidence of non-insulin dependent diabetes mellitus in women. Lancet. 1991; 338:774-778.
12. Manson JE, Nathan DM, Krolewski AS, Stampfer MJ, Willett WC, Hennekens CH. A Prospective study of exercise and incidence of diabetes among US male physicians. JAMA. 1992; 268:63-67.
13. Hu FB, Sigal RJ, Rich-Edwards JW, et al. Walking compared with vigorous physical activity and risk of type 2 diabetes in women. JAMA. 1999; 282:1433-1439.
14. Moore LL, Visioni AJ, Wilson PWF, D'Agostino RB, Finkle WD, Ellison RC. Can sustained weight loss in overweight individuals reduce the risk of diabetes mellitus? Epidemiology. 2000; 11:269-273.
15. Wolever TMS, Hamad S, Chiasson J-L, et al. Day-to-day consistency in amount and source of carbohydrate intake associated with improved glucose control in type 1 diabetes. J Am Coll Nutr. 1999; 18:242-247.
16. Chaturvedi N, Stevens LK, Fuller JH. The WHO Multinational Study of Vascular Disease in Diabetes. Mortality and morbidity associated with body weight in people with IDDM. Diabetes Care. 1995; 18:761-765.
17. American Diabetes Association. Nutrition recommendations for people with diabetes mellitus (position statement). Diabetes Care. 2001.
18. Franz MJ, Bantle JP, Beebe CA, et al. Evidence-based nutrition recommendations for diabetes and complications (technical review). Diabetes Care. 2001.
19. Beebe CA. Nutrition therapy for type 2 diabetes. In: Franz MJ, Bantle JP, eds. *American Diabetes Association Guide to Medical Nutrition Therapy for Diabetes*. Alexandria, VA: American Diabetes Association; 1999:46-68.
20. Boden G, Chen X. Effects of fat on glucose uptake and utilization in patients with non-insulin dependent diabetes. J Clin Invest. 1995; 96:1261-1267.
21. Mayer-Davis EJ, Monacoo JH, Hoen HM, et al. Dietary fat and insulin sensitivity in a triethnic population: the role of obesity. The Insulin Resistance Atherosclerosis Study. Am J Clin Nutr. 1997; 65:79-87.
22. Albright A, Franz M, Hornsby G, et al. American College of Sports Medicine position stand. Exercise and type 2 diabetes. Med Sci Sports Exerc. 2000; 32:1345-1350.
23. Jenkins DJ, Ocana A, Jenkins AL, et al. Metabolic advantages of spreading the nutrient load: effects of increased meal frequency in non-insulin-dependent diabetes. Am J Clin Nutr. 1992; 55:461-467.
24. Bertelsen J, Christiansen C, Thomsen C, et al. Effect of meal frequency on blood glucose, insulin, and free fatty acids in NIDDM subjects. Diabetes Care. 1993; 16:4-7.

25. Franz MJ, Monk A, Barry B, et al. Effectiveness of medical nutrition therapy provided by dietitians in the management of non-insulin-dependent diabetes mellitus: a randomized, controlled clinical trial. J Am Diet Assoc. 1995; 95:1009-1017.
26. *Report of a Joint FAO/WHO Expert Consultation*. Carbohydrates in Human Nutrition. Rome, Italy: Food and Agriculture Organization of the United Nations and World Health Organization; 1998.
27. Bantle JP, Raatz SK, Thomas W, Georgopoulos A. Effects of dietary fructose on plasma lipids in healthy subjects. Am J Clin Nutr. 2000; 72:1128-1134.
28. Akgum S, Ertel NH. A comparison of carbohydrate metabolism after sucrose, sorbitol, and fructose on plasma lipids in healthy subjects. Am J Clin Nutr. 2000; 72:1128-1134.
29. Powers M. Sugar alternatives and fat replacers. In: Franz MJ, Bantle JP, Eds. *American Diabetes Association Guide to Medical Nutrition Therapy for Diabetes*. Alexandria, Va: American Diabetes Association; 1999:148-164.
30. World Health Organization Expert Committee on Food Additives, *Toxicological Evaluation of Certain Food Additives and Food Contaminants*. Geneva, Switzerland: World Health Organization. 1981; 16:11-27 and 1983; 18:12-14.
31. Franz MJ. Protein controversies in diabetes. Diabetes Spectrum. 2000; 13:132-141.
32. Tuck M, Corry D, Trujillo A. Salt-sensitive blood pressure and exaggerated vascular reactivity in the hypertension of diabetes mellitus. Am J Med. 1990; 88:210-216.
33. Koivisto VA, Tulokas S, Toivonen M, et al. Alcohol with the meal has no adverse effects on postprandial glucose homeostasis in diabetic patients. Diabetes Care. 1993; 16:1612-1614.
34. Mooradian AD, Failla M, Hoogwerf B, Maryniuk M, Wylie-Rosert J. Selected vitamins and minerals in diabetes mellitus: a technical review. Diabetes Care. 1994; 17:464-479.
35. Kanis JA. The use of calcium in the management of osteoporosis. Bone. 1999;24:279-290.
36. Maryniuk MD. Counseling and education strategies for improved adherence to nutrition therapy. In: Franz MJ, Bantle JP, eds. *American Diabetes Association Guide to Medical Nutrition Therapy for Diabetes*. Alexandria, Va: American Diabetes Association; 1999:369-386.
37. American Dietetic Association. *Manual of Clinical Dietetics*. 6th Edition, 2000.
38. US Department of Agriculture. *The Food Guide Pyramid*. Hyattsville, MD: USDA Human Nutrition Information Service; 1992.
39. National Dairy Council. *Guide to Good Eating*. 6th Edition. Rosemont, IL. 1992.
40. The First Step in Diabetes Meal Planning. Alexandria, VA and Chicago: American Diabetes Association and American Dietetic Association; 2003.
41. Healthy Food Choices. Alexandria, VA and Chicago: American Diabetes Association and American Dietetic Association; 1986.

42. Eating Healthy with Diabetes. Alexandria, VA, and Chicago: American Diabetes Association and American Dietetic Association; 2003.
43. Healthy Eating for People with Diabetes and Comida Saludable para Personas con Diabetes. Minneapolis: IDC Publishing; 1997.
44. Exchange Lists for Meal Planning. Alexandria, VA and Chicago: American Diabetes Association and American Dietetic Association; 2003.
45. Basic Carbohydrate Counting. Alexandria, VA and Chicago: American Diabetes Association and American Dietetic Association; 2003.
46. Advanced Carbohydrate Counting. Alexandria, VA and Chicago: American Diabetes Association and American Dietetic Association; 2003.
47. My Food Plan and MI Plan de Comidas. Minneapolis: IDC Publishing; 1998.
48. My Food Plan for Kids and Teens. Minneapolis: IDC Publishing; 1998.
49. My Food Plan for Early Kidney Disease. Minneapolis: IDC Publishing; 2000.
50. My Food Plan Made Easy. Minneapolis: IDC Publishing; 2000.
51. Single-Topic Diabetes Resources. Alexandria, Va and Chicago: American Diabetes Association and American Dietetic Association; 1996.
52. Facilitating Lifestyle Change: A Resource Manual. Alexandria, Va and Chicago: American Diabetes Association and American Dietetic Association; 1996.
53. The Idaho Plate Method Meal Planning Guide. Idaho Falls, Idaho: Idaho DCE Plate Method, LLC; 1999.
54. Rizzor, HM. and Richards, S. All Our Patients Need to Know About Intensified Diabetes Management They Learned in Fourth Grade. *The Diabetes Educator*. 1998; 26: 392-404.
55. Camelson, KM., Hadell, K., Jamsen, PT, Ketonen, KJ, et al. The Plate Model: A visual method of teaching meal planning. *J Am Diet Assoc*. 98:1155-1158.
56. American Diabetes Association. Food Labeling (position statement). *Diabetes Care*. 2001; 24, (suppl): 5102-5103.
57. Wheeler ML, Franz, MH, Heins, J, et al. Food Labeling (technical review), *Diabetes Care*. 1994; 17: 480-487.
58. American Diabetes Association. Translation of the diabetes nutrition recommendations for health care institutions. *Diabetes Care*. 2001; 24 (suppl 1):549.
59. Schafer RG, Bohannon B, Franz M, et al. Translation of the diabetes nutrition recommendations for health care institutions. *Diabetes Care*. 1997; 20:96-105.
60. American Diabetes Association. Translation of the diabetes nutrition recommendations for Health Care institutions. *Diabetes Care*. Jan 2003; 26; (suppl.1).

61. Franz MJ, Etzwiller DD, Kpumes KP. et. al. *Learning to Live Well with Diabetes*. Minnetonka, MN:IDC Publishing: 1991.
62. American Diabetes Association. Physical activity/exercise and diabetes mellitus. Diabetes Care. Jan 2003;26, (suppl.1):573-577.
63. Franz, MJ, et al. *A Core Curriculum for Diabetes Educators*. Diabetes in the Life Cycle and Research. 4th Edition. 2001.
64. Position of the American Dietetic Association: Nutrition and lifestyle for a healthy pregnancy outcome. J Am Diet Assoc. Oct 2002. 102; 10:1479-1490.
65. American Diabetes Association. Self-monitoring of blood glucose (consensus statement). Diabetes Care. 1994; 18:81-86.
66. Adapted from Holler HJ, Pastors JG. *Diabetes Medical Nutrition Therapy*. Chicago, ILL; American Dietetics Association; 1997:46.

REACTIVE HYPOGLYCEMIA

I. Purpose

The purpose of nutrition care is to prevent symptoms of hypoglycemia in sensitive persons after carbohydrate ingestion.

II. Indicators

There are two types of hypoglycemia, fasting and postprandial (reactive). Fasting hypoglycemia often is related to disease processes, while reactive hypoglycemia can occur with no recognizable disease present.¹ The guidelines presented apply to nutrition management of reactive hypoglycemia.

III. Diet Prescription

Treatments of reactive hypoglycemia vary based on the specific causes and by individual.

- A. Alimentary hypoglycemia is specific to gastric surgery and involves prevention and treatment of dumping syndrome.¹
- B. Dietary modifications for idiopathic reactive hypoglycemia may include the following:
 - 1. Increased frequency of meals, usually 6 feedings/day (helpful for both alimentary and idiopathic reactive hypoglycemia).^{1, 4-7}
 - 2. Decreased portions at meals for alleviation of symptoms in individuals who normally consume large meals.⁵
 - 3. Well-timed meals and snacks throughout the day (may be sufficient to control all symptoms).^{1, 4-6}
 - 4. Mixed meals, including less-refined carbohydrates (limited refined carbohydrates), protein, fat and fiber, which can decrease the transit time of carbohydrate through the digestive system.⁴⁻⁶
 - 5. Limited intake or avoidance of alcoholic beverages, which can interfere with the liver's ability to release stored glucose.⁸
 - 6. Limited intake or avoidance of caffeine in the diet, which may reduce cerebral blood flow and glucose supply to the brain.⁹
 - 7. Use of a carbohydrate counting system to regulate total intake of carbohydrates.

IV. Types of hypoglycemia

A. Fasting

Fasting hypoglycemia is often associated with the use of insulin or some oral diabetes medications in the treatment of diabetes mellitus. Fasting hypoglycemia can also be a result of no food intake for 8 or more hours. Other less common causes of fasting hypoglycemia may include pancreatic tumors (insulinoma), pancreatic islet cell disease, severe congestive heart failure, and hepatic enzyme deficiencies⁴ (see Table 1). Although some types of fasting hypoglycemia require surgery (insulinoma), medication adjustments and diet therapy are the primary treatments for fasting hypoglycemia.¹

Table 1

Possible Causes of Fasting Hypoglycemia	
A. Drugs	
1. Insulin	
2. Sulfonyureas	
3. Alcohol consumption	
4. Salicylates	
5. Pentamidine	
6. Quinine	
B. Critical organ failure	
1. Renal failure	
2. Hepatic failure	
3. Cardiac failure	
4. Sepsis	
5. Malnutrition	
C. Hormonal Deficiencies	
1. Cortisol	
2. Growth Hormone	
3. Glucagon + Epinephrine	
D. Extra pancreatic tumor	
E. Endogenous Hyperinsulinism	
1. Pancreatic beta-cell disorders: neoplastic (insulinoma), hyperplastic or functional	
2. Insulin secretagoues (e.g. sulfonyureas)	
3. Autoimmune hypoglycemias: antibodies to insulin, antibodies to insulin receptors	
F. Neoglycemias of infancy and childhood	
1. Neonatal hypoglycemias	
2. Congenital deficiencies of glucogenic enzymes	
3. Ketotic hypoglycemia of childhood	

Source: American Dietetic Association. Reactive Hypoglycemia. *Manual of Clinical Dietetics*, 6th Edition. Chicago, IL: American Dietetic Association; 2000.

B. Reactive

1. Diagnosis

A true reactive hypoglycemia is difficult to diagnose, and the prevalence is unknown.^{4,10} Postprandial (reactive) hypoglycemia is most often caused by alimentary hypoglycemia (dumping syndrome) secondary to gastric surgery. Other causes can be idiopathic in nature or are related to rare enzyme deficiencies. Examples of these deficiencies are hereditary fructose intolerance, familial fructose or galactose intolerance, leucine sensitivity, and galactosemia. Idiopathic reactive hypoglycemia is poorly defined and has been associated with the following symptoms:^{1-6, 11, 12}

- b. A fall in blood glucose levels below normal within 2-5 hours after eating.
- c. Low blood glucose and hypoglycemic symptoms (tachycardia, sweating, dizziness, hunger, weakness, fatigue, mental status changes, blurred vision, or agitation) occurring simultaneously.^{2,5,12}
- d. Resolution of low blood glucose levels spontaneously in an hour or less after the initial reaction.
- e. Quick relief of symptoms with the ingestion of rapid-acting carbohydrate.

There are currently no universally accepted criteria for diagnosing reactive hypoglycemia. The oral glucose tolerance test is no longer recommended as it does not reflect or establish the cause of symptoms in everyday life. One technique includes confirmation of a finger stick low blood glucose level at the time that a patient is having hypoglycemic symptoms during an ordinary mixed meal. Someone may be falsely diagnosed if they do not show low blood glucose levels when they are experiencing symptoms during a normal meal.^{1-4,6,7,11}

2. Physiology

When blood glucose levels fall below normal, the hormone glucagon releases stored glucose from the liver to raise the blood glucose level. The adrenergic hormone epinephrine is released, which is responsible for the symptoms of weakness, fatigue, sweating, and tachycardia. These are the same symptoms that are seen during an anxiety or panic attack as epinephrine is also released in response to stress.¹¹⁻¹² Often a diagnosis of reactive hypoglycemia can be mistaken in persons with anxiety or panic attacks without low blood glucose levels (pseudohypoglycemia).⁴

Rare enzyme defects, usually present in childhood can cause reactive hypoglycemia. There is normal insulin secretion but reduced glucagon response with increased insulin sensitivity.¹³ Alimentary hypoglycemia, usually seen following gastric surgery, is due to rapid entry (“dumping”) of ingested carbohydrate into the small intestine. There is a rapid rise in blood glucose levels which stimulates insulin secretion, resulting in hypoglycemia⁴.

3. Alternate therapies

If dietary modification fails to prevent symptoms of reactive hypoglycemia, there are several medications that have been used successfully. These medications include calcium-channel blockers, anticholinergic agents, and somatostatin.^{5,6} Chromium supplementation has been suggested as a benefit to some patients, however others have reported a worsening of symptoms with this.¹⁴

REFERENCES:

1. Foster DW, Rubenstein AH. Hypoglycemia. *Harrison's Principles of Internal Medicine*. 14th Edition. New York, NY McGraw Hill Inc; 1998:2081-2084.
2. Service FJ. Hypoglycemic disorders. N Engl J Med. 1995; 332:1144-1152.
3. Brun JF, Bouix O, Monnier JF, et al. Increased insulin sensitivity and vassal insulin effectiveness in postprandial reactive hypoglycemia. I Acta Diabetologia. 1996; 33:1-6.
4. Clutter WE, Cryer PE. Hypoglycemia. *Internal Medicine*. 4th Edition. St Louis, MO: Mosby Year Book Inc; 1994; 1424-1430.
5. Ahmadpour S, Kabadi UM. Pancreatic alpha-cell function in idiopathic reactive hypoglycemia. In Metab: Clin Exp. 1997; 46:639-643.
6. Prince, MJ. Hypoglycemia of nondiabetic origin, Curr Ther Endocrinol Metab. 1994; 5:413-416.
7. Charles MA. Comparison of oral glucose tolerance tests and mixed meals in patients with apparent idiopathic postabsorptive hypoglycemia: absence of hypoglycemia after meals. Diabetes. 1981; 30:465.
8. Berczeller PH. Alcohol hypoglycemia. Hosp Pract. 1993; 28; 41-42.
9. Kerr D, Sherwin RS, Pavalkis F, et al. Effect of caffeine on the recognition of and responses to hypoglycemia in humans. Ann Intern Med. 1993; 119:799-804.
10. Brun JF, Fedou C, Bouix O, et al. Evaluation of a standardized hyperglucuduc breakfast test in postprandial reactive hypoglycemia. Diabetologica. 1995; 38; 494-501.
11. Berlin I, Grimaldi A, Landault C, et al, Suspected postprandial hypoglycemia is associated with beta-adrenergic hypersensitivity and emotional distress. J Clin Endocrinol Metab. 1994; 79:1428-1433.
12. Cryer PE. Glucose conterregulation: prevention and correction of hypoglycemia in humans. Am J Physiol. 1993; 264:E149.
13. Leonetti F, Fonicello M, Iozzo P, et al. Increased nonoxidative glucose metabolism in idiopathic reactive hypoglycemia. Metab: Clin Exp. 1996; 45:606-610.
14. McCarty MF. Chromium and other insulin sensitizers may enhance glucagon secretion: implications for hypoglycemia and weight control. Med Hypothesis, 1996; 46:77-80.

WEIGHT MANAGEMENT

PURPOSE

To help overweight and obese clients adopt healthful and sustainable eating and exercise behaviors for reduced disease risk and improved feelings of energy and well-being. The goal of treatment should be re-focused from weight loss alone to weight management, which means the best weight possible in the context of overall health.

NUTRITIONAL ADEQUACY

A well-planned weight management diet may be nutritionally adequate. However, when the caloric level is reduced below 1500 calories per day, care must be taken to assure nutritional adequacy. A multivitamin/mineral may be needed.

PRINCIPLES

Lifestyle behaviors modified to maintain successful weight loss include:

- Gradual changes to healthful eating styles with an emphasis on increasing whole grains, fruits, and vegetables.
- Choose lower fat dairy products, leaner meats, and foods prepared with little or no fat.
- Limit alcohol.
- Nonrestrictive approaches to eating based on internal regulation of food (hunger and satiety).
- Gradual increases to at least 30 minutes of enjoyable physical activity each day.

Caloric intake should be reduced by 500 to 1000 calories (kcal/day) from the current level to produce weight loss of one to two pounds per week. The diet should be low in calories, but it should not be too low (less than 800 kcal/day*). In general, diets containing 1,000 to 1,200 kcal/day should be selected for most women; a diet between 1,200 kcal/day and 1,600 kcal/day should be chosen for men and may be appropriate for women who weigh 165 pounds or more, or who exercise. For nutritional adequacy, the diet should include 30% or less of total calories from fat, 10% or less saturated fat, 8-10% of polyunsaturated fat, up to 15% monounsaturated fat. Carbohydrate should be 55% or more of total calories, and protein approximately 15% of total calories.

***Lower calorie diets have been found to be no more effective in producing weight loss. They should be monitored by a physician or registered dietitian.**

ASSESSMENT

Assessment of a patient should include the evaluation of body mass index (BMI), waist circumference, and overall medical risk. BMI provides a more accurate measure of total body fat compared with the assessment of body weight alone. According to the guidelines established by the World Health Organization, individuals with a BMI of 25.0 to 29.9 kg/m² are considered overweight and those with a BMI \geq 30 kg/m² are considered obese. However, clinical judgment must be used with muscular patients in which BMI may overestimate the degree of fatness. In addition, excess **abdominal** fat is an independent risk factor for disease. Some diseases or risk factors place patients at a high absolute risk for mortality requiring more aggressive management (see *Table 1* Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risk).

BMI can be calculated by using either of the formulas below or using the BMI chart in the appendix:

BMI = Weight (kg) ÷ Height (meters) squared OR

BMI = Weight (lbs) x 703 ÷ Height (inches) squared

Table 1

Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risk*

	BMI (kg/m ²)	Obesity Class	Disease Risk* (Relative to Normal Weight and Waist Circumference)	
			Men ≤40 in (≤ 102 cm) Women ≤ 35 in (≤ 88 cm)	> 40 in (> 102 cm) > 35 in (> 88 cm)
Underweight	<18.5		-	-
Normal†	18.5 – 24.9		-	-
Overweight	25.0 – 29.9		Increased	High
Obesity	30.0 – 34.9	I	High	Very High
	35.0 – 39.9	II	Very High	Very High
Extreme Obesity	≥ 40	III	Extremely High	Extremely High

* Disease risk for type 2 diabetes, hypertension, and CVD.

† Increased waist circumference can also be a marker for increased risk even in persons of normal weight.

Adapted from "Preventing and Managing the Global Epidemic of Obesity. Report of the World Health Organization Consultation of Obesity." WHO, Geneva, June 1997.⁴

Evaluation of readiness for weight loss should include:

- Reasons and motivation for weight loss
- Previous attempts at weight loss
- Support expected from family and friends
- Understanding of risks and benefits
- Attitudes toward physical activity
- Time availability
- Potential barriers, including financial limitations, to the person's adoption of change

TREATMENTS/PROCEDURES

Goals of therapy are to reduce body weight and maintain a lower body weight for the long term; the prevention of further weight gain is the minimum goal. An initial weight loss of 10 percent of body weight achieved over 6 months is a recommended target. A weight loss greater than 1-2 pounds each week does not achieve better long-term results. After the first 6 months of weight loss therapy, the priority should be weight maintenance through diet, physical activity, and behavior. Further weight loss can be considered after a period of weight maintenance. **A physician should be consulted before and during any weight loss program** (see Table 2 - A Quick Reference Tool to Act).

Physical Activity

Physical activity is important to expend calories for weight loss and weight maintenance. A reduced risk of heart disease is achieved by physical activity more than weight loss alone. Reduction of body fat and prevention of decrease in lean muscle mass during weight loss is a goal of physical activity. A physician should authorize physical activity, with a long-term goal of at least 30 minutes or more of moderate-intense physical activity accumulated daily. An obese person should generally increase activity slowly with care to avoid injury. A wide variety of activities and/or household chores is recommended to achieve physical activity goals.

Behavior Therapy

Dietary behavior changes can help to decrease eating without feeling deprived. Slowing the pace of eating, and using a smaller plate to decrease portion size can help increase satiety. Developing scheduled meal times can help patients who skip or delay meals and consequently overeat later.

Self monitoring, reward, and stimulus control are some behavior modification techniques used to increase compliance with diet and activity goals for long-term maintenance of a desired weight.

- **Self monitoring** refers to recording behaviors such as calorie or food intake and exercise. A desired outcome such as a weight change may also be recorded. Individual and specific information including amount, time, and type of food or activity can help with behavior monitoring.
- **Rewards** can be used to promote attainment of behavior goals. A tangible material reward, such as a movie or an inexpensive item may be used, or rewards may be intangible such as an hour of personal time. Many smaller rewards for attainment of smaller goals are recommended rather than large rewards for long, difficult goals.
- **Stimulus control** includes monitoring environmental and social events that are associated with undesired eating, such as eating while watching TV. Recognizing the cue that causes the behavior through reflection or self-monitoring can help the person to develop a strategy to avoid problem eating.

Pharmacotherapy

Pharmacotherapy may be helpful for eligible high-risk patients after consideration of all potential risks and benefits and after all behavioral options have been exhausted. Pharmacotherapy, approved by the FDA for long-term treatment, can be a helpful adjunct for the treatment of obesity in some patients. These drugs should be used only in the context of a treatment program that includes the elements described previously – diet, physical activity, and behavior therapy. If lifestyle changes do not promote weight loss after 6 months, drugs should be considered with carefully selected persons. Pharmacotherapy is currently limited to those patients who have a BMI greater or equal to 30, or those who have a BMI greater or equal to 27 if concomitant obesity-related risk factors or diseases exist. However, not all patients respond to a given drug. If a patient has not lost 4.4 pounds after 4 weeks, it is not likely that this patient will benefit from the drug (see *Table 2 - A Quick Reference Tool to Act*).

Weight Loss Surgery

Surgery is an option for patients with extreme obesity. Weight loss surgery provides medically significant sustained weight loss for more than 5 years in most patients. Although there are risks associated with surgery, it is not yet known whether these risks are greater in the long-term than those of any other form of treatment. Surgery is an option for well-informed and motivated patients who have clinically severe obesity, serious co-morbid conditions and who have consistently failed at other weight loss attempts. Surgical patients should be monitored for complications and lifestyle adjustments throughout their lives (see *Table 2 - A Quick Reference Tool to Act*).

Fad Diets

Fad diets may promise miracle cures with minimal effort or without “dieting”. Some diets promote high protein and low carbohydrate intake to induce weight loss by achieving a state of ketosis, which may result in electrolyte imbalance and cardiac abnormalities. Diet macronutrient composition varies. Most diet plans claim to produce weight loss through restriction of certain foods, but any cut in calorie levels may produce weight loss. Fad diets often lack nutritional balance, advocate “good” or “bad” foods, lack scientific evidence, and use “gimmicks” which result in short term weight loss usually caused by water loss which is quickly regained on cessation of the diet.

Table 2
A Quick Reference Tool to ACT

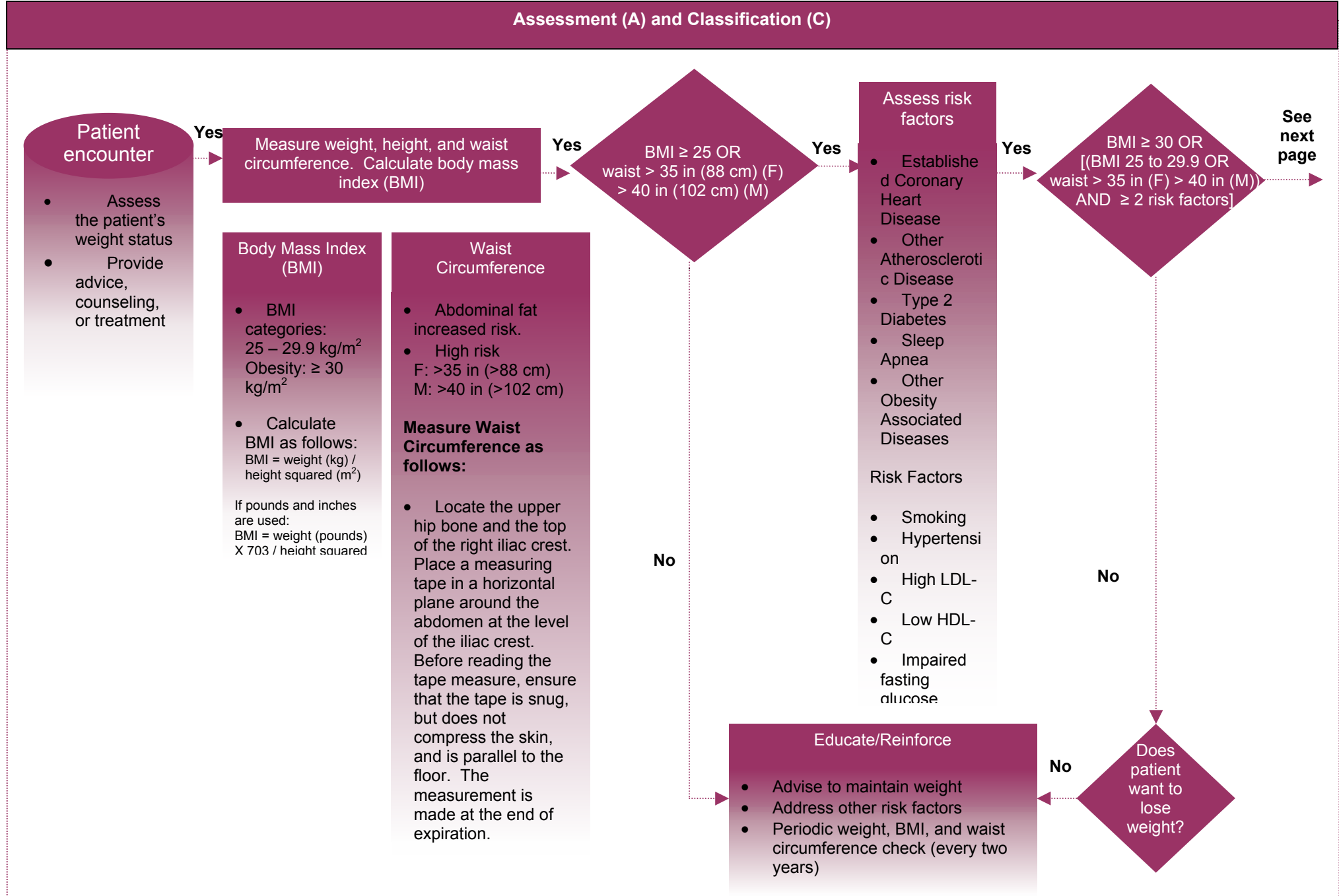
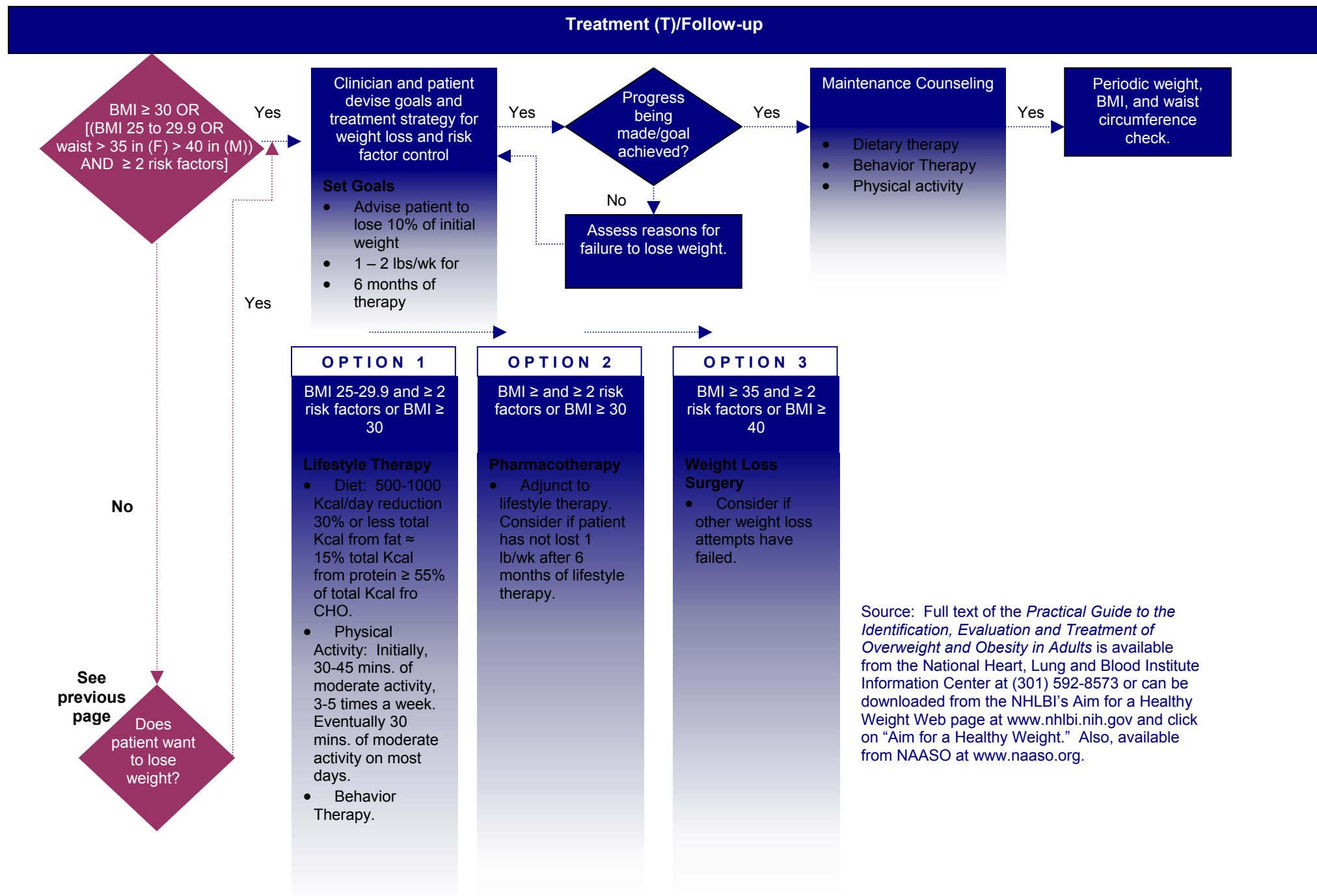


Table 2
A Quick Reference Tool to ACT



<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts (2-3 servings)	Lean meat, fish, poultry - 2 oz. Eggs - 2 (limit to <4/week). Dried beans or legumes cooked - ½ c.	Limit or avoid luncheon meats, hot dogs, fried meats.
Milk, Yogurt, and Cheese (2 servings)	Skim milk, buttermilk – 1 cup. (1% milk can be used if skim is not tolerated). Non-fat dry skim milk – 1/3 cup. Low-fat yogurt – 1 cup. Low-fat cottage cheese – ½ cup. Low-fat cheeses (mozzarella, ricotta, farmers) – 1 ½ oz.	Limit or avoid whole milk, evaporated whole milk, cheddar and Swiss cheeses.
Bread, Cereal, Rice, Pasta, and Starchy Vegetables (6-11 servings)	Whole wheat and enriched bread – 1 slice. Hot cereals – ½ cup. Ready-to-eat cereals – ¾ cup. Macaroni, noodles, spaghetti, rice, cooked – ½ cup. Plain crackers – 5.	Limit or avoid cornbread, muffins, biscuits, butter crackers.
Fruit (2-4 servings)	Fresh or raw – 1 med or 1 cup. Canned or frozen without sugar – ½ c. Fruit Juice (100%) – ½ cup.	Limit or avoid sweetened fruits and juices.
Fruits high in vitamin C (One serving per day)	Orange, strawberries, cantaloupe, grapefruit, orange juice, grapefruit juice and other juices enriched with vitamin C.	
Vegetables (3-5 servings)	Broccoli, cabbage, brussels sprouts, cauliflower, green or red peppers, green beans, tomatoes, potatoes, peas, corn, etc. ½ - 1 cup.	Limit or avoid vegetables prepared with fat or sauces.
Dark Green and Orange (Include 3-4 servings per week)	Includes: broccoli, asparagus, brussels sprouts, greens, spinach, carrots.	

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Fats and Oils (Limit to 2-3 servings per day)	All kinds. Margarine, oil, salad dressing – 1 tsp. Cream cheese, sour cream, gravy – 1 Tbsp. Whenever possible, choose products made with corn, cottonseed, soy or sunflower oil.	Avoid extra servings.
Other (Limit to 3-4 servings per week)	Cookies – 2. Ice cream, sherbet, custard, puddings – ½ cup. Plain angel food, pound or sponge cake – small slice. Doughnut – 1. Wine – 3 oz. Beer – 12 oz. Alcohol – 1 ½ oz. Chips – 1 oz.	Limit or avoid very high calorie items such as cake with icing, pies, cobblers, or dips unless specially prepared to lower calories.
Beverages and fluids (As desired)	Artificially sweetened beverages, coffee, coffee substitutes, tea.	Limit or avoid fruitades, regular carbonated beverages.
Miscellaneous (As desired)	Artificial sweeteners, cocoa (1 tsp), mustard, vinegar, horseradish, dill pickles, low calorie salad dressings (2 Tbsp), spices, lemon or lime juice. If desired: sugar, jam or jelly – not to exceed 2-3 tsp/day.	Limit or avoid sweet pickles, sugar, sauces, coconut.

SAMPLE MEAL PLAN

BREAKFAST

Orange Juice, ½ cup
Whole Wheat Toast, 1 slice
Egg, 1 medium
Oatmeal, ½ cup
Milk, skim, 1 cup
Margarine (low-fat), 1 tsp
Sugar Substitute, 1 packet

LUNCH

Vegetable Soup, ¾ cup
Roast Beef, 2 oz
Whole Wheat Bread, 1 slice
Tossed Salad, 1 cup
Salad Dressing (fat-free) 2 tsp
Apple, 1 small
Mayonnaise (fat-free), 1 Tbsp
Coffee/Tea

DINNER

Chicken Breast, 2 oz
Brown Rice, 1/3 cup
Broccoli, cooked, ½ cup
Wheat Roll, 1
Margarine, low-fat, 1 tsp
Peach, 1 medium
Angel Food Cake, 1 oz

SNACK

Milk, Skim, 1 cup

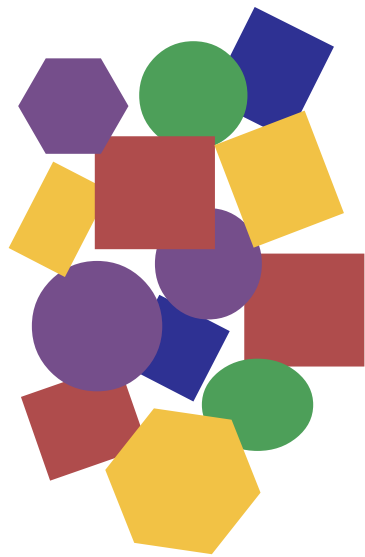
The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% = Percent of Total Calories)

Calories	1200
Protein	60 grams (27%)
Fat	32 grams (17%)
CHO	170 grams (57%)
Cholesterol	322 grams

REFERENCES:

1. Position of the American Dietetic Association: Weight Management. J Am Diet Assoc. 2002: 102:1145-1155.
2. American Dietetic Association, *Manual of Clinical Dietetics*, 6th Edition, 2000.
3. *The Practical Guide Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*, National Heart Lung and Blood Institute, Obesity Education Initiative. NIH Publication No. 00-4084, October 2000.
4. World Health Organization. *Obesity: Preventing and Managing the Global Epidemic of Obesity*. Report of the WHO Consultation of Obesity. Geneva, 3-5 June 1997.
5. Missouri Department of Health, *Missouri Diet Manual*, 8th Edition, 1996.



Modifications For Renal Disease

NUTRITIONAL MANAGEMENT OF RENAL DISEASE

Nutritional management of the patient with kidney disease is complex and requires a wide range of knowledge and experience from the registered dietitian (RD). Prerequisite, are a thorough knowledge of the functions of the kidney as well as the effects of kidney failure on the human organism. The RD must also possess the knowledge and medical nutrition therapy (MNT) skills for a variety of underlying and concurrent disease states, (i.e. diabetes, hypertension, nutrition support, etc.) as well as, effective counseling skills.

PURPOSE: The purpose of the diet is to achieve/maintain an appropriate body weight and to achieve/maintain nutrition-related lab and clinical indices within an appropriate range. In the patient with kidney insufficiency, the diet should be designed to slow the progression of the disease, as well as, prevent/minimize uremic symptoms.

NUTRITIONAL ADEQUACY: In some pre-dialysis diets, protein allotment may fall short of the Recommended Dietary Allowance (RDA). Calcium supplementation may be necessary due to the restriction of dairy products. Otherwise, dietary plans for those with kidney disease should be adequate in all nutrients.

Energy: Enough energy must be provided to enable the patient to maintain a desirable body weight. This level of caloric intake is similar to the RDA for the healthy adult population. Sufficient kilocalories will also ensure that the protein is used for tissue synthesis and repair. Energy needs vary according to present weight, type of dialysis (calories from dialysate used in peritoneal dialysis must be considered), concurrent diseases and activity level.

Protein: Protein allowance varies with kidney function. In the pre-dialysis patient, adequate protein should be provided to keep serum albumin within a normal range while avoiding uremic symptoms. In the patient who has kidney failure and requires dialysis, a more generous allowance of protein is encouraged, as well as, in those patients who have an underlying disease, which brings about a catabolic state, (i.e. AIDS). A minimum of 50% of protein should be provided by high quality sources, (i.e. meat, poultry, fish, eggs, soy, and milk).

Phosphorus: Phosphorus is restricted to maintain serum phosphorus levels within appropriate range. Often phosphorus binders, such as calcium salts or sevelamer, must be utilized in order to accomplish this. Elevated phosphorus levels are associated with bone disease and calcification of soft tissues.

Potassium: As urine output declines so does the ability to regulate serum potassium. Dietary potassium is often restricted as urine output falls below 1000 ml/24 hours resulting in elevated serum potassium levels. Acidosis, catabolic stress, surgery, trauma, various drugs, and hypoaldosteronism can also be responsible for hyperkalemia.

Sodium: Sodium is restricted to aid in the control of blood pressure and prevent the gain of excessive body fluid.

Fluid: As urine output declines, fluid is restricted. Pre-dialysis and peritoneal dialysis patients often have little or no restriction of fluids whereas hemodialysis patients are encouraged to adhere to their fluid restriction to avoid the complications of hypertension, congestive heart failure, and the need to remove excessive quantities of fluid during dialysis.

Vitamins and minerals: Patients on chronic dialysis should be taking a daily vitamin formulation specific for these patients. This supplement typically contains B-complex vitamins as well as vitamin C. It is not recommended that patients with kidney failure take fat-soluble vitamins or excessive amounts of vitamin

C. As kidney function deteriorates, patients may require further supplementation with calcium, iron, zinc, and/or vitamin D.

NUTRIENT RECOMMENDATIONS FOR CHRONIC RENAL INSUFFICIENCY

GFR (ml/min)	Protein (g/kg/day)	Energy * (kcal/kg/day)	Phosphorus (mg/kg/day)
> 60-70	Protein restriction not recommended unless progression is evident.	≥ 35	Not restricted
25-60	(1.) 0.55-0.60 including ≥ 0.35 gm/kg/day HBV (2.) 0.28 g/kg/day supplemented with Essential Amino Acids (EAA) or Ketoacid/Essential Amino Acid Mixture (KA)	≥ 35 ≥ 35	≤ 10 5-9
5-25	(1.) 0.55-0.60 including ≥ 0.35 gm/kg/day HBV (2.) 0.28 g/kg/day supplemented with EAA or KA	≥ 35 ≥ 35	≤ 10 5-9
<5	No evidence that low protein diet is beneficial at this level of glomerular filtration rate (GFR). To maintain nutritional status or prevent malnutrition, renal replacement therapy should be initiated by the time the GFR falls to this level.		

* Energy intake recommended for chronic renal failure patients consuming limited amount of protein. May be cautiously decreased in obese patients or those who are gaining excess adipose tissue at this intake level.

Reprinted with permission from *Pocket Guide to Nutrition Assessment of the Renal Patient*, 2nd Edition, © National Kidney, Foundation, Inc.

REFERENCES:

1. Mitch, W. and Klahr, S., Eds. *Nutrition and the Kidney*, pg. 198, Little, Brown & Co., 1993.
2. Kopple, J. and Massry, S., Eds. *Nutritional Management of Renal Disease*, Williams & Wilkins, 1997.

DAILY NUTRIENT RECOMMENDATIONS FOR RENAL DISEASE

	Acute¹	Pre-Dialysis	Nephrotic Syndrome	Hemodialysis	Peritoneal Dialysis	Transplant Post-op/ Chronic
Protein gm/kg ideal or standard BW	0.6-0.8 usual May increase based on renal function and treatment	0.55-0.6 >60% HBV	0.8-1.0 gm/kg Replacing urine losses controversial	1.2-1.4 >50% HBV	1.2-1.5 >50% HBV	1.3-2.0 0.8-1.0
Energy kcal/kg ideal or standard BW	35-50 depends on stress/ status of nutrition	≥35: may decrease for over-weight, but monitor carefully	35 kcal/kg unless pt is overweight; ↑ complex CHO ↓ cholesterol; <30% fat	30-35	≥35 incl dialysate kcals; 20-25 for weight loss	30-35 maintain IBW, limit fat to 30% kcal, <300 mg cholesterol/day
Na+ gm/day	1-2 gm/day based on B/P, edema; replace diuretic phase	Varies from 1-3 gm/day ² to no added salt	1 gm/day ²	1-3 gm/day ²	2-4 gm/day Monitor fluid balance	2-4 gm/day 2-4 gm/day
K+ gm/day	2 gm/day Maintain serum <5 mEq/L. Replace diuretic phase losses	Usually unrestricted unless ↑ serum level	Usually unrestricted	2-3 gm/day Adjust to serum levels	3-4 gm/day Adjust to serum levels	Unrestricted, unless serum level ↑, may need diet restriction with cyclosporin
Phosphorus	Maintain serum value WNL	10-12 mg/gm protein or ≤10 mg/kg/day	≤12 mg/kg/day	12-15 mg/gm protein or ≤17 mg/kg BW/day	12-15 mg/gm protein or ≤17 mg/kg BW/day	RDA- RDA supplement as needed
Calcium gm/day	Maintain serum WNL (adjusted)	1.0-1.5	Same as pre-dialysis	1.4-1.6 (Include binder load)	0.8-1.0 (Include binder load)	0.8-1.5 0.8-1.5

DAILY NUTRIENT RECOMMENDATIONS FOR RENAL DISEASE, cont.

	Acute ¹	Pre-Dialysis	Nephrotic Syndrome	Hemodialysis	Peritoneal Dialysis	Transplant Post-op/Chronic
Fluid cc/day	Output plus 500 cc	No restriction	Monitor/maintain balance	Output + 1000 cc	Keep fluid balance – 2000 +	Unrestricted, unless fluid overloaded
Vitamins/Minerals (Daily)	RDA: adjust to degree of catabolism, TPN-may require multivitamin & minerals	RDA; B-complex & C Individualize vit D, Fe, Zinc	Same as pre-ESRD Research is needed to quantify needs. May need vitamin D	C: 60-100 mg B6-2 mg Folate-1 mg B12-3 ug/d RDA others vit E-15 IU/d Zinc-15 mg/d individualize Fe, Vit D.	Same as HD but may need 1.5 to 2 mg of B1 due to dialysis loss	RDA, may need additional vitamin D
Fiber	Increases dietary fiber may be beneficial to renal patients, however, optimal dose/source/long term clinical benefits have not yet been established. 20-25 gm/day recommended.					

¹ TPN recommendations can be found in Chapter 9. ² **Editorial Note:** It is seldom necessary to impose a 1 gm Na⁺ sodium restriction on HD or PD patients and that level of sodium is generally difficult to achieve in an outpatient setting.

Reprinted with permission from *Pocket Guide to Nutrition Assessment of the Renal Patient*, 2nd Edition, © National Kidney, Foundation, Inc.

REFERENCES:

1. Kopple, J.D. and Massry, S.G., *Nutritional Management of Renal Disease*, Williams & Wilkins, 1997.
2. Mitch, W.E. and Klahr, S., *Nutrition and the Kidney*, Little, Brown & Co., 1993.

NATIONAL RENAL DIET (NRD) FOOD CHOICE (EXCHANGE) VALUES (Non-Diabetic)

FOOD GROUP	kcal	PRO (gm)	Na+ (mg)	K+ (mg)	P (mg)
Milk	120	4.0	80	185	110
Milk Substitute	140	0.5	40	80	30
Meat	65	7.0	25	100	65
Starches	90	2.0	80	35	35
Vegetables - Low Potassium Medium Potassium High Potassium	25	1.0	15	70 150 270	20
Fruit - Low Potassium Medium Potassium High Potassium	70	0.5	TR	70 150 270	15
Fats	45	-	55	10	5
High Calorie	100	-	15	20	5
Beverage	Varies	-	Varies	Varies	Varies
Salt Choices	-	-	250	-	-

NATIONAL RENAL DIET FOOD CHOICE (EXCHANGE) VALUES (Diabetic)

Food Group	kcal	CHO (gm)	PRO (gm)	FAT (gm)	Na+ (mg)	K+ (mg)	P (mg)
Milk	100	8.0	4.0	5	80	185	110
Milk Substitute	140	12.0	0.5	10	40	80	30
Meat	65	-	7.0	4	25	100	65
Starches	80	15	2.0	1	80	35	35
Vegetables - Low Potassium Medium Potassium High Potassium	25	5	1.0	TR	15	70 150 270	20
Fruit – Low Potassium Medium Potassium High Potassium	60	15	0.5	-	TR	70 150 270	15
Fat	45	-	-	5	55	10	5
High Calorie	60	15	TR	-	15	20	5
Beverage	Varies	Varies	Varies	Varies	Varies	Varies	Varies
Salt Choices	-	-	-	-	250	-	-

Reprinted with permission from *Pocket Guide to Nutrition Assessment of the Renal Patient*, 2nd Edition, © National Kidney, Foundation, Inc.

MEAL PATTERNS (Based on Exchange Values of the NRD)

Grams of Protein	40	60	60	80	100
Food Groups	Servings	Servings	Servings	Servings	Servings
Milk			1	1	2
Milk Substitute	2	1			
Meat	4	6	5	8	10
Starch	4	6	7	8	8
Veg., Low K+	1	1	1	1	1
Veg., Med K+		1	1	1	
Veg., High K+	2	1	1	1	1
Fruit, Low K+	1	2	2	1	1
Fruit, Med K+	2	1	2	2	1
Fruit High K+	2	2	2	1	1
Fats	8	8	8	8	6
High Calorie	3	3	1	-	-
Beverage	2	1	1	1	-
Salt Choices	4	3	3	2	2

(Meal Patterns = approx. 2100 kcal, 2 gm Na⁺, 2.5 gm K⁺, <15 mg P/gm Protein)

Reprinted with permission from *Pocket Guide to Nutrition Assessment of the Renal Patient*, 2nd Edition, © National Kidney, Foundation, Inc.

NATIONAL RENAL DIET: RENAL EXCHANGE LIST

The foods in this list are divided into groups according to the amounts of protein, potassium, sodium, and phosphorus they contain. Serving sizes are important for the success of the diet. To learn serving sizes, it will help to weigh or measure the food. Suggestions about how to weigh and measure are found in the section on Weights and Measures.

MILK CHOICES	----- choices per day
--------------	-----------------------

Average per choice: 4 grams protein, 120 Calories, 80 milligrams sodium, 185 milligrams potassium, 110 milligrams phosphorus.

Milk (nonfat, low-fat, whole)	1/2 cup
Lo Pro	1 cup
Buttermilk, cultured	1/2 cup
Chocolate milk	1/2 cup
Light cream or half and half	1/2 cup
Ice milk or ice cream	1/2 cup
Yogurt, plain or fruit-flavored	1/2 cup
Evaporated milk	1/4 cup
Sweetened condensed milk	1/4 cup
Cream cheese	3 Tablespoons
Sour cream	4 Tablespoons
Sherbet	1 cup

NONDAIRY MILK SUBSTITUTES	----- choices per day
---------------------------	-----------------------

Average per choice: 0.5 gram protein, 140 Calories, 40 milligrams sodium, 80 milligrams potassium, 30 milligrams phosphorus

Dessert, nondairy frozen	1/2 cup
Dessert topping, nondairy frozen	1/2 cup
Liquid nondairy creamer, polyunsaturated	1/2 cup

MEAT CHOICES	----- choices per day
--------------	-----------------------

Average per choice: 7 grams protein, 65 Calories, 25 milligrams sodium, 100 milligrams potassium, 65 milligrams phosphorus.

Prepared Without Added Salt

Beef	1 ounce
Round, sirloin, flank, cubed, T -bone, and porterhouse steak;	
tenderloin, rib, chuck, and rump roast;	
ground beef or ground chuck	
Pork	1 ounce
Fresh ham, tenderloin, chops, loin roast, cutlets	
Lamb	1 ounce
Chops, leg, roasts	

Prepared Without Added Salt (Continued)

Veal	1 ounce
Chops, roasts, cutlets	
Poultry	1 ounce
Chicken, turkey, Cornish hen, domestic duck and goose	
Fish	
Fresh and frozen fish	1 ounce
Lobster, scallops, shrimp, clams	1 ounce
Crab, oysters	1 1/2 ounce
Canned tuna, canned salmon (canned without salt)	1 ounce
Sardines (canned without salt) #	1 ounce
Wild game	1 ounce
Venison, rabbit, squirrel, pheasant, duck, goose	
Egg	
Whole	1 large
Egg white or yolk	2 large
Low-cholesterol egg product	1/4 cup
Chitterlings	2 ounces
Organ meats #	1 ounce

Prepared With Added Salt

Beef	1 ounce
Deli-style roast beef *	
Pork	1 ounce
Boiled or deli-style ham *	
Poultry	1 ounce
Deli-style chicken or turkey *	
Fish	
Canned tuna, canned salmon *	1 ounce
Sardines * #	1 ounce
Cheese	
Cottage *	1/4 cup

The following are high in sodium, phosphorus, and/or saturated fat. They should be used in your diet only as advised by your dietitian.

- Bacon
- Black beans, black-eyed peas, great northern beans, lentils, lima beans, navy beans, pinto beans, red kidney beans, soybeans, split peas, turtle beans
- Frankfurters, bratwurst, Polish sausage
- Luncheon meats, including bologna, braunschweiger, liverwurst, picnic loaf, summer sausage, salami
- Nuts and nut butters
- All cheeses except cottage cheese

* High sodium--each serving counts as
1 Meat choice and 1 Salt choice.

High phosphorus

STARCH CHOICES

----- choices per day

Average per choice: 2 grams protein, 90 Calories, 80 milligrams sodium, 35 milligrams potassium, 35 milligrams phosphorus.

BREADS AND ROLLS

Bread (French, Italian, raisin, light rye, sourdough, white)	1 slice (1 ounce)
Bagel	1/2 small
Bun, hamburger or hot dog type	1/2
Danish pastry or sweet roll, no nuts	1/2 small
Dinner roll or hard roll	1 small
Doughnut	1 small
English muffin	1/2
Muffin, no nuts, bran, or whole-wheat	1 small (1 ounce)
Pancake * #	1 small (1 ounce)
Pita or "pocket" bread	1/2 6-in diameter
Tortilla, corn	2 6-in diameter
Tortilla, flour	1 6-in diameter
Waffle * #	1 small (1 ounce)

CEREALS AND GRAINS**Prepared Without Added Salt**

Cereals, ready-to-eat, most brands	3/4 cup
Puffed rice	2 cups
Puffed wheat	1 cup
Cereals, cooked	
Cream of Rice or Wheat, Farina, Malt-O-Meal	1/2 cup
Oat bran or oatmeal, Ralston	1/3 cup
Cornmeal, cooked	3/4 cup
 Grits, cooked	 1/2 cup
Flour, all-purpose	2 1/2 Tablespoons
Pasta (noodles, macaroni, spaghetti), cooked	 1/2 cup
Pasta made with egg (egg noodles), cooked	 1/3 cup
Rice, white or brown, cooked	1/2 cup

CRACKERS AND SNACKS

Crackers: saltines, round butter	4 crackers
Graham crackers	3 squares
Melba toast	3 oblong
RyKrisp *	3 crackers
Popcorn, plain	1 1/2 cup popped
Tortilla Chips	3/4 ounce, 9 chips
Pretzels, sticks or rings *	3/4 ounce, 10 sticks
Pretzels, sticks or rings, unsalted	3/4 ounce, 10 sticks

* High sodium -- each serving counts as
1 Starch choice and 1 Salt choice.

High phosphorus.

CAKES

Cake, angel food	1/20 cake or 1 ounce
Cake	2 X 2-in square or
	1 1/2 ounce
Sandwich cookie * #	4 cookies
Shortbread cookie	4 cookies
Sugar cookie	4 cookies
Sugar wafer	4 cookies
Vanilla wafer	10 cookies
Fruit pie (apple, berry, cherry, peach)	1/8 pie
Sweetened gelatin	1/2 cup

The following foods are high in poor-quality protein and/or phosphorus. They should be used only when advised by your dietitian.

- Bran cereal or muffins, Grape-Nuts cereal, granola cereal or bars
- Boxed, frozen, or canned meals, entrees, or side dishes
- Black beans, black-eyed peas, great northern beans, lentils, lima beans, navy beans, pinto beans, red kidney beans, soybeans, split peas, turtle beans
- Pumpernickel, dark rye, whole-wheat, or oatmeal bread
- Whole-wheat cereals
- Whole-wheat crackers

VEGETABLE CHOICES

----- choices per day

Average per choice: 1 gram protein, 25 Calories, 15 milligrams sodium, 20 milligrams phosphorus.

1/2 cup per choice unless otherwise indicated.

Prepared or Canned Without Added Salt Unless Otherwise Indicated

Low potassium (0-100 milligrams)

Alfalfa sprouts (1 cup)	Cucumber, peeled
Bamboo shoots, canned	Endive
Beans, green, or wax	Escarole
Bean sprouts	Lettuce, all varieties (1 cup)
Cabbage, raw	Pepper, green, sweet
Chinese cabbage, raw	Water chestnuts, canned
Chard, raw	Watercress

- * High sodium – each serving counts as
1 Starch choice and 1 Salt choice.
- # High phosphorus.

Medium potassium (101-200 milligrams)

Artichoke
 Broccoli
 Cabbage, cooked
 Carrots, raw (1 small)
 Cauliflower
 Celery, raw (1 stalk)
 Collards
 Corn (or 1/2 ear) #
 Eggplant
 Kale
 Mushrooms, canned # or fresh raw

Mustard greens
 Onions
 Peas, green #
 Radishes
 Sauerkraut * * *
 Snow peas
 Spinach, raw
 Squash, summer
 Turnip greens
 Turnips

High Potassium (201-350 milligrams)

Asparagus (5 spears) #
 Avocado (1/4 whole)
 Celery, cooked

 Kohlrabi

 Mushrooms, fresh cooked #

 Okra#
 Parsnips #
 Pepper, chili
 Potato, boiled or mashed
 Pumpkin
 Rutabagas #
 Tomato (1 medium)
 Tomato juice, unsalted
 Tomato juice, canned with salt *
 Tomato puree (2 Tablespoons)
 Tomato sauce (1/4 cup)

Beets
 Brussels sprouts #
 Vegetable juice cocktail,
 unsalted
 Vegetable juice cocktail,
 canned with salt * *
 Bamboo shoots,
 fresh cooked %
 Beet greens (1/4 cup) %
 Chard, cooked %
 Chinese cabbage, cooked %
 Potato, baked (1/2 medium) %
 Potato, hashed brown %
 Potato chips (1 ounce, 14 chips) %
 Spinach, cooked # %
 Sweet potato # %
 Tomato paste (2 tablespoons) %
 Winter squash (1/4 cup) %

Prepared Or Canned With Salt

Vegetables canned with salt (use serving size listed above) *

- * High sodium – each serving counts as
 1 Vegetable choice and 1 Salt choice.
- ** High sodium – each serving counts as
 1 Vegetable choice and 2 Salt choices.
- *** High sodium – each serving counts as
 1 Vegetable choice and 3 Salt choices.
- # High phosphorus
- % Very high potassium.

FRUIT CHOICES

----- **choices per day**

Average per choice: 0.5 gram protein, 70 Calories, 15 milligrams phosphorus.

1/2 cup per choice unless otherwise indicated

Low potassium (0-100 milligrams)

Applesauce	Lemon (1/2)
Blueberries	Papaya nectar
Cranberries (1 cup)	Peach nectar
Cranberry juice cocktail (1 cup)	Pears, canned
Grape juice	Pear nectar

Medium potassium (101-200 milligrams)

Apple (1 small, 2 1/2-in diameter)	Mango
Apple juice	Papaya
Apricot nectar	Peach, canned
Blackberries	Peach, fresh (1 small, 2-in diameter)
Cherries, sour or sweet	Pineapple, canned or fresh
Figs, canned	Plums, canned or fresh (1 medium)
Fruit cocktail	Raisins (2 Tablespoons)
Grapes (15 small)	Raspberries
Grapefruit (1/2 small)	Rhubarb
Grapefruit juice	Strawberries
Gooseberries	Tangerine (2 1/2-in diameter)
Lemon juice	Watermelon (1 cup)

High potassium (201-350 milligrams)

Apricots, canned or fresh (2 halves)	Nectarine (1 small, 2-in diameter)
Apricots, dried (5)	Orange juice
Cantaloupe (1/8 small)	Orange (1 small, 2 1/2-in diameter)
Dates (1/4 cup)	Pear, fresh (1 medium)
Figs, dried (2 whole)	Banana % (1/2 medium)
Honeydew melon (1/8 small)	Prune juice %
Kiwi fruit (1/2 medium)	Prunes, dried or canned (5) %

% Very high potassium.

FAT CHOICES	----- choices per day
--------------------	-----------------------

Average per choice: trace protein, 45 Calories, 55 milligrams sodium, 10 milligrams potassium, 5 milligrams phosphorus.

Unsaturated Fats

Margarine	1 teaspoon
Reduced-calorie margarine	1 Tablespoon
Mayonnaise	1 teaspoon
Low-calorie mayonnaise	1 Tablespoon
Oil (safflower, sunflower, corn, soybean, olive, peanut, canola)	1 teaspoon
Salad dressing (mayonnaise-type)	2 teaspoons
Salad dressing (oil-type)	1 Tablespoon
Low-calorie salad dressing (mayonnaise-type)	2 Tablespoons
Low-calorie salad dressing * (oil-type)	2 Tablespoons
Tartar sauce	1 1/2 teaspoon

Saturated Fats

Butter	1 teaspoon
Coconut	2 Tablespoons
Powdered coffee whitener	1 Tablespoon
Solid shortening	1 teaspoon

HIGH-CALORIE CHOICES	----- choices per day
-----------------------------	-----------------------

Average per choice: trace protein, 100 Calories, 15 milligrams sodium, 20 milligrams potassium, 5 milligrams phosphorus

BEVERAGES

Carbonated beverages (fruit flavors, root beer; colas or pepper-type)#	1 cup
Kool-Aid	1 cup
Limeade	1 cup
Lemonade	1 cup
Cranberry juice cocktail	1 cup
Tang	1 cup
Fruit-flavored drink	1 cup
Wine**	1/2 cup

FROZEN DESSERTS

Fruit ice	1/2 cup
Popsicle (3 ounces)	1 bar
Juice bar (3 ounces)	1 bar
Sorbet	1/2 cup

Remember to count these choices within your fluid allowance.

* High sodium—each serving counts as one fat choice and one salt choice.

High phosphorus.

** Check with your physician before using alcohol.

CANDY AND SWEETS

Butter mints	14 pieces
Candy corn	20 or 1 ounce
Chewy fruit snacks	1 pouch
Cranberry sauce or relish	1/4 cup
Fruit chews	4
Fruit Roll Ups	2
Gumdrops	15 small
Hard candy	4 pieces
Honey	2 Tablespoons
Jam or jelly	2 Tablespoons
Jelly beans	10
LifeSavers or cough drops	12
Marmalade	2 Tablespoons
Marshmallows	5 large
Sugar, brown or white	2 Tablespoons
Sugar, powdered	3 Tablespoons
Syrup	2 Tablespoons

The following foods are high in poor-quality protein and/or phosphorus. They should be used only when advised by your dietitian.

- Beer**
- Chocolate
- Nuts and nut butters

SALT CHOICES

----- choices per day

Average per choice: 250 milligrams sodium.

Salt	1/8 teaspoon
Seasoned salts (onion, garlic, etc.)	1/8 teaspoon
Accent	1/4 teaspoon
Barbecue sauce	2 Tablespoons
Bouillon	1/3 cup
Catsup	1 1/2 Tablespoon
Chili sauce	1 1/2 Tablespoon
Dill pickle	1/6 large or 1/2 ounce
Mustard	4 teaspoons
Olives, green	2 medium or 1/3 ounce
Olives, black	3 large or 1 ounce
Soy sauce	1/4 teaspoon
Light soy sauce	1 teaspoon
Steak sauce	2 1/2 teaspoons
Sweet pickle relish	2 1/2 Tablespoons
Taco sauce	2 Tablespoons
Tamari	3/4 teaspoon
Teriyaki sauce	1 1/4 teaspoon
Worcestershire sauce	1 Tablespoon

** Check with your physician before using alcohol.

BEVERAGE CHOICES

----- choices per day

The following beverages may be used as desired within your daily fluid allowance:

- Carbonated beverages (except Moxie, colas, and pepper-type)
- Ice
- Lemonade
- Limeade
- Mineral water
- Water

The following beverages contain moderate amounts of potassium and/or phosphorus. They should be used in your diet only as advised by your dietitian.

- Beer**
- Coffee, regular or decaffeinated
- Coffee substitute (cereal-grain beverage)
- Cola or pepper-type carbonated beverages
- Tea
- Thirst-quencher beverages
- Wine**

The following liquids are very high in sodium, potassium, and/or phosphorus. They should be used in your diet only as advised by your doctor or dietitian.

- Broth
- Bouillon
- Consommé
- Salt-free broth or bouillon containing potassium chloride (KCl)

Remember: Anything that is liquid or melts at room temperature must also be counted in your fluid allowance (for example, ice cream, Popsicles, sherbet, gelatin).

WEIGHTS AND MEASURES

The serving sizes of foods in the food groups may be less or more than you usually eat. By weighing or measuring your food you can be certain that you are not eating too much or too little. Standard measuring cups and spoons can be used for most foods. A small scale that weighs in ounces should be used to weigh cooked meat portions (without the bone, skin, or shell). The table below can help you convert from one measuring system to another.

DRY MEASUREMENTS

1 teaspoon	5 grams (g)
3 teaspoon = 1 Tablespoon	15 g
4 Tablespoons = 1/4 cup	60 g
16 Tablespoons = 1 cup	240 g

** Check with your physician before using alcohol.

LIQUID MEASUREMENTS	APPROXIMATE METRIC CONVERSION
2 Tablespoons = 1 fluid ounce (fl oz)	30 milliliters (mL)
1 jigger = 1 1/2 fl oz	45 mL
1/4 cup = 2 fl oz	60 mL
1/3 cup = 2 2/3 fl oz	80 mL
1/2 cup = 4 fl oz	120 mL
3/4 cup = 6 fl oz	180 mL
1 cup = 8 fl oz	240 mL
2 cups = 16 fl oz = 1 pint	500 mL
4 cups = 32 fl oz = 1 quart	1000 mL = 1 liter (L)

Note: 1 mL = 1 cubic centimeter (cc)
500 mL = 1/2 kilogram (1.1 lb)
1000 mL = 1 kilogram (2.2 lb)

Reprinted with permission of The American Dietetic Association, Chicago, Illinois.

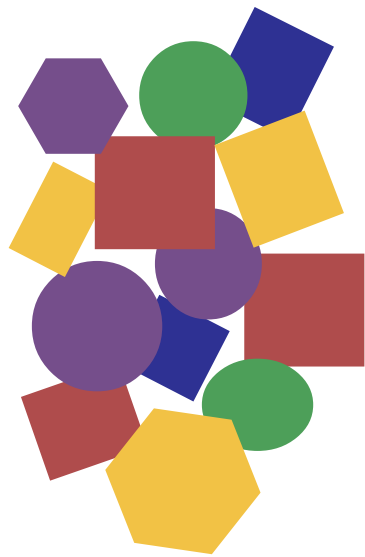
REFERENCES:

1. McCann, Linda, *Pocket Guide to Nutrition Assessment of the Renal Patient*, 2nd Edition. National Kidney Foundation, 1998.
2. *A Clinical Guide to Nutrition Care in End Stage Renal Disease*, 2nd Edition. The American Dietetic Association.
3. The American Dietetic Association, *Manual of Clinical Dietetics*, 6th Edition, 2000.

CALCULATION SHEET

Food Choices	No. of Choices	Kcal	Pro (g)	CHO (g)	Fat (g)	Na (mg)	K (mg)	P (mg)
Goals								
Milk		100	4.0	8	5	80	185	110
Nondairy		140	0.5	12	10	40	80	30
Meat		65	7.0		4	25	100	65
Starch		80	2.0	15	1	80	35	35
Vegetable:								
Low K		25	1.0	5		15	70	20
Medium K		25	1.0	5		15	150	20
High K		25	1.0	5		15	270	20
Fruit:								
Low K		60	0.5	15			70	15
Medium K		60	0.5	15			150	15
High K		60	0.5	15			270	15
Subtotal								
Fat		45			5	55	10	5
High-Calorie		60		15		15	20	5
Beverage								
Subtotal								
Salt						250		
TOTAL								

This page intentionally left blank



Modifications In Fat

HIGH LDL CHOLESTEROL / DYSLIPIDEMIA

DESCRIPTION

Dyslipidemia is a term used to describe abnormalities in blood lipids that include a high blood level of LDL (low-density lipoprotein) cholesterol, low HDL (high-density lipoprotein) cholesterol and high triglycerides. Dyslipidemia is recognized as an independent risk factor for coronary heart disease (CHD) and other atherosclerotic diseases.

Medical Nutrition Therapy (MNT) is recommended as the first line treatment for dyslipidemia. Nutrition recommendations include modifications in fat and cholesterol intake, calorie modifications for weight management, and the use of food sources providing key nutrients that have demonstrated improvement in lipid levels and cardiovascular disease (CVD) outcomes.

Table 1: Classification of Blood Lipid Levels
National Cholesterol Education Program Adult Treatment Panel III

	<u>mg/dL</u>	<u>Classification</u>
LDL Cholesterol	<100	Optimal
	100-129	Near normal/above optimal
	130-159	Borderline high
	160-189	High
Total Cholesterol	<200	Desirable
	200-239	Borderline high
	>240	High
HDL Cholesterol	<40	Low
	>60	High
Triglycerides	<150	Normal
	150-199	Borderline high
	200-499	High
	>500	Very High

Note: If the testing is non-fasting, only values for total cholesterol and HDL cholesterol will be usable. In this case, if total cholesterol is ≥ 200 mg/dL or HDL is < 40 mg/dL, a follow up lipoprotein profile is needed for appropriate therapy based on LDL. A fasting lipoprotein profile is recommended every five years for everyone over 20 years of age.

After a cardiac event, individual lab results may not show elevated LDL cholesterol levels. LDL cholesterol levels begin to decline in the first few hours after a cardiac event and within the first 24 to 48 hours, these levels are significantly decreased and may remain low for up to three months.

HIGH LDL CHOLESTEROL

High LDL cholesterol is a major risk factor for CVD and is the primary target of MNT. Lowering LDL cholesterol reduces risk of developing CVD and reduces mortality, coronary events and strokes in persons with established CVD. The recommended target LDL cholesterol level is based on each individual's risk of developing heart disease.

Major Risk Factors that Affect LDL Cholesterol Goals

National Cholesterol Education Program Adult Treatment Panel III

- Cigarette smoking
- Hypertension (>140/90 mmHg or on blood pressure medication)
- Low level of HDL cholesterol (<40 mg/dL)
- Family history of early heart disease (CHD in father or brother before age 55; CHD in mother or sister before age 65)
- Age (men 45 years or older; women 55 years or older)

High HDL cholesterol ≥ 60 counts as a negative risk factor; subtract one from the total count..

Table 2: Risk Factor Points/10 year CHD Risk

If two or more major risk factors are present, the 10-year risk score is used to determine risk category. Five different risk score categories (age, total cholesterol, HDL cholesterol, smoking, and systolic blood pressure) are added together to determine the total number of risk points

1. Age Risk Points

Age	Men	Women
20-34	-9	-7
35-39	-4	-3
40-44	0	0
45-49	3	3
50-54	6	6
55-59	8	8
60-64	10	10
65-69	11	12
70-74	12	14
75-79	13	16

2. Total Cholesterol (mg/dL) /Age Risk Points

Men	20-39	40-49	50-59	60-69	70-79
<160	0	0	0	0	0
160-199	4	3	2	1	0
200-239	7	5	3	1	0
240-279	9	6	4	2	1
≥ 280	11	8	5	3	1
Women	20-39	40-49	50-59	60-69	70-79
<160	0	0	0	0	0
160-199	4	3	2	1	1
200-239		6	4	2	1
240-279	11	8	5	3	2
≥ 280	13	10	7	4	2

3. HDL (mg/dL) Risk Points

>60	-1
50-59	0
40-49	1
>40	2

4. Smoking /Age Risk Points

Men	20-39	40-49	50-59	60-69	70-79
Nonsmoker	0	0	0	0	0
Smoker	8	5	3	1	1
Women					
Nonsmoker	0	0	0	0	0
Smoker	9	7	4	2	1

5. BP Risk Points No Meds On BP Medication*

Systolic BP	M	F	M*	F*
<120	0	0	0	0
120-129	0	1	1	3
130-139	1	2	2	4
140-159	1	3	2	5
≥ 160	2	4	3	6

10-Year Risk Score Percentage

Risk points from the five risk categories are totaled and scaled to the Framingham risk score percentages to determine the risk of developing heart disease in the next 10 years. Classification for LDL cholesterol goals and MNT recommendations are based on the number of major risk factors and the 10-year risk percentage. People with a 0-1 risk factor almost always have a 10-year risk <10%. Thus a 10-year risk assessment in people with 0-1 risk factor is not necessary. Although not counted in this risk analysis, the life-habit risks scores are known to add significant risk for CHD. These include obesity, physical inactivity, and an atherogenic diet.

Therapeutic Lifestyle Changes (TLC)

Lifestyle changes, termed Therapeutic Lifestyle Changes or TLC by the National Cholesterol Education Program (NCEP), are the primary treatment for elevated LDL. Essential features of TLC are:

- Saturated fat <7% of total calories
- Cholesterol intake <200 mg per day
- Soluble fiber (10-25g/day) and plant stanols/sterols (2 g/day)
- Weight reduction if needed
- Moderate physical activity to expend approximately 200 kcal/day.

Table 3: 10-Yr Risk Scale

Point Total	Risk of Developing CHD in next 10 years	
	M	F
<0	<1%	<1%
0-4	1%	<1%
5-6	2%	<1%
7	3%	<1%
8	4%	<1%
9	5%	1%
10	6%	1%
11	8%	1%
12	10%	1%
13	12%	2%
14	16%	2%
15	20%	3%
16	25%	4%
17	≥30%	5%
18	≥30%	6%
19	≥30%	8%
20	≥30%	11%
21	≥30%	14%
22	≥30%	17%
23	≥30%	22%
24	≥30%	27%
≥25	≥30%	≥30%

Table 4: LDL Cholesterol Goals and Cut off points for TLC and Drug Therapy in Different Risk Categories

Risk Classification	Risk Category	LDL Goal (mg/dL)	LDL Level to start TLC Diet (mg/dL)	LDL Level to consider Drug Therapy (mg/dL)
CHD, diabetes, or 10-year risk score >20%	Highest	<100	≥100	≥130 (100-129 optional)
2 or more risk factors and 10-year risk score 10-20%	Next Highest	<130	≥130	10-year Risk 10-20% >130
2 or more risk factors and 10-year risk score <10%	Moderate	<130	≥130	10-year Risk <10% ≥160
0 or 1 risk factor*	Low-Moderate	<160	≥160	>190 (160-189 optional)

Therapeutic Lifestyle Changes (TLC) Diet

Low Cholesterol, Low Saturated Fat Diet

The TLC diet follows the recommendations of the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP III) of the National Institutes of Health (NIH) and the American Heart Association (AHA). Major objectives of the TLC diet are to:

1. Limit the intake of saturated and *trans*-fatty acids,
2. Limit cholesterol intake,
3. Promote a healthy weight, and
4. Include nutrients and foods that provide optimum nutrition and are beneficial to lipid control, including soluble fiber, plant stanol/sterol esters.

Table 5: TLC Diet Nutrient Composition

Nutrient	Recommended Intake
Saturated Fat*	Less than 7% of total calories
Polyunsaturated fat	Up to 10% of total calories
Monounsaturated fat	Up to 20% of total calories
Total Fat	25-35% of total calories
Carbohydrate**	50-60% of total calories
Fiber	20-30 g/day
Protein	Approximately 15% of total calories
Cholesterol	Less than 200 mg/day
Total Calories***	Balance energy intake and expenditure to maintain desirable body weight and to prevent weight gain

* *Trans*-fatty acids are another LDL-raising fat that should be kept at a low intake. The AHA recommends that *trans*-fats be combined with saturated fat total.

** Carbohydrate should be derived predominantly from foods rich in nutrients and fiber, including skim milk, fruits, vegetables, and whole grains.

*** Daily energy expenditure should include at least moderate physical activity (contributing approximately 200 Kcal per day).

Source: Executive Summary of the Third Report of the NCEP Expert panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA. 2001;285:2486-2497.

Diet Order Terminology

- TLC Diet is preferred. Low Cholesterol, Low Saturated Fat Diet is another terminology for the diet.
- Weight reduction goals and recommendations, if desired, will be included as part of the TLC Diet by the registered dietitian working with the patient.
- Sodium control or other modification in diet, if required, should be specifically ordered.

TLC Diet Definitions

Saturated Fatty Acids (SFA)

Limiting intake of saturated fat is the main dietary goal for reducing blood levels of LDL cholesterol. Reducing intake of saturated fat directly decreases LDL cholesterol and also the atherogenic very-low-density lipoprotein (VLDL) remnants.

Foods high in saturated fats include whole and 2% fat dairy products, fatty meats, tropical oils (coconut, palm, and palm kernel), and cocoa butter. Saturated fats are generally solid at room temperature. Hydrogenation, the process of adding hydrogen to vegetable oils to make vegetable shortening or margarine, increases the saturated and/or *trans* fatty acid content of the fat.

Recommendation: <7% of total calories

Trans-Fatty Acids

Trans-fatty acids increase LDL cholesterol and also decrease HDL cholesterol. Because *trans*-fats decrease HDL, increasing the ratio of LDL to HDL cholesterol, they are considered more atherogenic than saturated fats that do not lower HDL cholesterol.

The majority of *trans*-fatty acids found in foods are created through hydrogenation of vegetable oils. Sources include stick margarine, shortening, and baked products made with these fats (cookies, crackers, snack foods), and commercially prepared fried foods. The oils used to fry foods in restaurants may be high in *trans*-fatty acids.

Food labels will list *trans*-fats as “hydrogenated” or “partially hydrogenated” vegetable oil on the ingredient list. Estimates of *trans*-fat content can be made from the Nutrition Facts found on the food label by adding the total grams of the saturated, polyunsaturated, and monounsaturated fats and subtracting that sum from the amount of Total Fat listed. Because of the *trans*-fat content of margarine, there has been public debate about whether margarine or butter is the better choice. The AHA recommends that if a solid fat is desired, a soft margarine with not more than 2 g of saturated fat per tablespoon and with liquid oil as the first ingredient, be used in place of stick margarine or butter. Margarines that contain no *trans*-fatty acids are available.

Recommendation: Counted in the total with saturated fat.

Polyunsaturated Fatty Acids (PUFA)

Two major categories are:

Omega 6 fatty acids

Substituting foods rich in omega-6 fatty acids for foods high in saturated fat results in a decrease in blood cholesterol levels. Intakes of amounts greater than 10% of total energy are not recommended because higher intakes are associated with decreased HDL cholesterol and may also increase risk of certain cancers. The AHA recommends that less than 10% of total calories be derived from polyunsaturated fats. Linoleic acid, the primary omega-6 fatty acid, is found in corn oil, safflower oil, soybean oil, nuts, and seeds.

Omega-3 fatty acids

Frequent consumption of fish is associated with reduced risk of coronary heart disease (CHD). Cold-water fish (salmon, mackerel, Atlantic herring, trout, swordfish) are the major sources of omega-3 fats. The AHA recommends consumption of two or more fish meals per week. Other sources include tofu, soybean, canola oils, flaxseed, and nuts.

Recommendation: <10% of total calories

Monounsaturated Fatty Acids (MUFA)

Substitution of MUFA for saturated fat lowers LDL cholesterol without decreasing HDL cholesterol. Oleic acid, the primary MUFA, may cause as great a decrease in LDL cholesterol levels as linoleic acid does when substituted for saturated fatty acids. Rich sources of monounsaturated fats include olive, canola and peanut oils, avocado, nuts, and seeds.

Recommendation: Up to 20% of total calorie intake

Total Fat

Total fat intake is directly related to the intake of saturated fat in the American diet. Moderate reduction of total fat (25%-30% of total calories) facilitates a decrease in saturated fatty acids and the following reduction in LDL cholesterol. Total fat intake is a major determinant of calorie intake. Lowering of total fat intake may also help in weight reduction in overweight individuals. Recommendations for total fat intake are based on the individual's total daily energy intake, metabolic profile, and need for weight loss. Very low-fat diets (less than 15% of total energy) are not recommended. Very low fat diets may lead to inadequate intake of essential fatty acids and may compound metabolic abnormalities seen in persons with high triglyceride levels, low HDL cholesterol levels, or insulin resistance.

Recommendation: 25-35% of total calories; avoid very low fat diets (<15% of calories)

Dietary Cholesterol

Dietary cholesterol can increase LDL cholesterol levels, although to a lesser extent than saturated fat. Reducing intake of high cholesterol foods provides the additional benefit of limiting intake of saturated fat, as most high cholesterol foods are also high in saturated fat. Dietary cholesterol is found only in animal products: meats, poultry, fish and full fat dairy products, with organ meats and egg yolks being especially rich sources. Dietary cholesterol appears most atherogenic when found in foods that are also high in saturated fat. Cholesterol-rich foods that are relatively low in saturated fatty acids, particularly eggs and shellfish, have a smaller effect on LDL cholesterol and may be integrated into the diet on a limited basis.

Recommendation: <200 milligrams/day

Dietary Fiber

Foods high in soluble fibers, specifically *B*-glucan and pectin, have been shown to reduce total and LDL cholesterol levels by binding cholesterol-rich bile acids in the intestines to help the body eliminate them. Although insoluble fiber seems to have little direct effect on cholesterol levels, total dietary fiber (both insoluble and soluble) may help control calorie intake and body weight by promoting satiety. Because fibers in foods are present as a mixture of both soluble and insoluble fibers, all foods rich in fiber are encouraged. High fiber foods include whole grains, fruits and vegetables, dried beans and peas, nuts and seeds. Including oats, barley, dried beans and peas, pectin fruits and vegetables, and psyllium seed in the diet can maximize soluble fiber intake. Fiber supplements are not recommended unless recommended by your physician.

Recommendation: 20-30g/day, with soluble fiber intake 10-25g/day

Stanol/sterol ester-containing foods

Stanol/sterol ester-containing foods decrease LDL cholesterol levels. Plant sterols are poorly absorbed and appear to compete with cholesterol for absorption from biliary secretions and from dietary intake. Plant sterols occur naturally and are isolated from soybean oils. Plant sterol-containing foods are recommended only for adults with high cholesterol or for secondary prevention after an atherosclerotic event because the long-term effects of stanol/sterol esters on the absorption of other nutrients are not known.

Recommendation: 2 to 3 g of plant sterols per day

Soy Protein

Soy protein foods, including soy beverages, tofu, tempeh, and soy-based meat alternatives, may help reduce total and LDL cholesterol when included in a diet low in saturated fat and cholesterol. Studies show that 25 grams of soy protein daily in the diet is needed to show a significant cholesterol lowering effect. Isoflavonoids, plant chemicals unique to soybeans may reduce the risk of CHD by which protecting LDL from oxidation and by increasing HDL cholesterol.

Recommendation: 25 g of soy protein per day

Alcohol

Alcohol intake does not affect LDL cholesterol levels. Moderate alcohol consumption has been shown to improve HDL cholesterol. Red wine contains a phytoestrogen, resveratrol, which inhibits cell-mediated oxidation of lipoproteins. Aside from these positive alcohol benefits, alcohol is not recommended for the prevention of CHD. Alcohol intake, especially at high levels, is associated with elevated triglycerides. Alcoholic beverages add calories that may contribute to excess weight.

Recommendation: Limit to two or fewer drinks for men and one drink or less for women per day

Calorie Intake

If overweight, total calories should be limited to promote weight loss. Calorie reduction with weight loss to attain a reasonable body weight may completely correct elevated LDL cholesterol in some individuals. Weight reduction in the overweight is also shown to reduce elevated triglycerides and raise HDL cholesterol levels. Modifying eating habits to decrease consumption of dietary fat, alcohol, and simple sugars is recommended for calorie reduction. Increasing physical activity to increase calorie expenditure will also assist with weight control.

Recommendation: Intake to promote a healthy weight

Other Dietary Factors:**Antioxidants**

Oxidative processes are involved in the development of CVD. Dietary antioxidants, including carotenoids and Vitamin E, may contribute to disease resistance. Consumption of antioxidant rich foods, including fruits, vegetables and whole grains is recommended. Because these foods are rich in many nutrients and fiber, it is difficult to isolate the role of antioxidants in preventing heart disease.

Recommendation: Eat a wide variety of fruits, vegetables and whole grains.

Folic acid

Folic acid, or folate, has been shown to influence homocysteine, an amino acid in the blood that appears to cause oxidation of LDL cholesterol and increase the risk of CVD. An inverse relationship has been found between serum folate and total homocysteine levels. Other factors influencing homocysteine levels are deficiencies in vitamin B6 and B12, age, sex, menopausal status, renal function, and certain medications.

Recommendation: Eat foods rich in folic acid, including citrus fruits, tomatoes, dark green or deep-yellow vegetables, enriched grains, and legumes.

**TLC/Low Cholesterol, Low Saturated Fat Diet
(200 milligrams Cholesterol)**

NUTRITIONAL ADEQUACY

TLC diet recommendations are planned to meet the Dietary Reference Intakes (DRIs) and are consistent with US Dietary Guidelines for Americans 2000 and American Heart Association Dietary Guidelines 2000. The recommended amount of iron may not be met for certain groups unless iron-rich foods are served frequently. An iron supplement may be necessary in these cases. See the USDA Food Guide Pyramid regarding recommended serving sizes for various age groups. The TLC diet recommendations are appropriate for individuals >2 years of age.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, and Fish (5 oz or less of lean cooked meat, poultry or fish per day)	Alternate plan: Eat 2-3 meatless meals per week to allow for 3 oz portions at remaining lunch and supper meals. Bake, broil, grill, or prepare with allowed fat.	Fatty meats, organ meats, canned, frozen, packaged and prepared meats in gravies or sauces (unless specially prepared using low cholesterol guidelines), commercially fried meats, poultry or fish.
	Beef or veal round, sirloin, or tenderloin (Choice or select cuts) 90% lean ground beef.	High fat beef (prime cuts, regular or lean ground beef or hamburger), corned beef, short ribs, veal cutlets.
	Pork tenderloin, loin chops, center cut ham, or Canadian bacon.	Bacon, sausage, spare ribs.
	Lamb loin or leg.	High fat lamb chops or steaks.
	Chicken, Cornish hen, or turkey. Remove poultry skin before eating.	Poultry skin, duck or goose.
	Fish, crab, lobster, clams, scallops, oysters, and tuna (water packed or rinsed), or herring. The AHA recommends more than two fish meals per week for the benefit of omega-3 fatty acids.	Fish roe; commercially breaded and fried fish. Sardines, shrimp and crayfish (unless counted in the 200 mg cholesterol per day limit-3 oz of steamed shrimp has approximately 165 milligrams of cholesterol).
	Non-fat or low fat lunch meats and hot dogs (≤ 2 g fat per ounce).	Lunchmeat or hot dogs containing more than 2 grams of fat per ounce.
	Wild game (venison, rabbit, squirrel, and pheasant).	Duck and goose.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Vegetable Protein Alternates (25 g of soy protein recommended per day)	One cup serving of cooked beans, peas or lentils, or 3 ounces of tofu can replace a 3-ounce serving of meat, poultry, or fish.	
Eggs (2 egg yolks or less per week)	Egg whites (substitute 2 whites for 1 whole egg) Low cholesterol egg substitutes.	Egg yolks in prepared foods unless counted from the two allowed.
Milk, Yogurt, and Cheese (2–3 servings daily)	Skim milk, ½% or 1% milk, evaporated skim milk, dry powdered skim milk, buttermilk made from skim milk, low-fat or non-fat yogurt.	2% milk, whole milk, evaporated or condensed whole milk, whole milk drinks, cream, sweet cream, half and half, non-dairy milk products and cream substitutes.
	Specially prepared cheeses made with allowed vegetable oils, cheese containing less than 2 grams fat per ounce. Non-fat or low-fat cottage cheese (2% or less). Non-fat cream cheese and sour cream.	Cheese or cheese products with more than 2 gram fat/ounce. Cream cheese and sour cream.
Vegetables (3 or more servings daily)	Fresh, frozen, cooked or canned, and prepared without fat or using recommended fats, vegetable juice	Buttered and creamed, seasoned or fried vegetables, unless prepared with recommended fat.
Fruits (2 or more servings daily)	Fresh, frozen, cooked or canned fruit, or juice. Serve and prepare with no fat or with allowed fat.	Fruit with sauces containing butter, cream, or cream cheese
Bread, Cereal, Pasta, and Rice (6 or more servings daily)	Whole grain (preferably) or enriched.	
	Breads, rolls, buns, English muffin, bagel (not egg), pita bread, Tortillas (not fried), macaroni, spaghetti, rice.	Those prepared with butter, cheese, or egg yolks, biscuits, donuts, sweet rolls, pancakes and waffles (unless made with allowed ingredients), egg bagels, egg noodles, chow mein noodles.
	Saltine, rye, oyster, graham crackers, animal crackers, pretzels.	Flavored crackers such as cheese or butter crackers and those made with coconut oil or palm oil.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
	Popcorn, air popped, popped with allowed oil, or low fat microwave. (≤ 2 g. of fat per serving) Baked chips. Cooked cereals, cold flaked, or bran cereals.	Popcorn packaged or prepared with hydrogenated fat (regular or butter microwave). Cheese, caramel or regular popcorn. Corn chips, tortilla chips. Cereals containing coconut or coconut oil or prepared with butter, cream, or other saturated fat (granola).
Fats and Oils (Number of servings based on calorie needs, typically less than 6 servings daily)	1 serving of fat, supplies an average of 5 grams of fat and 45 calories (serving size noted). Margarines containing plant stanol/sterol ester (2-3g. plant stanol/sterols/day) are recommended. Oil (1 tsp.): canola, olive, safflower, sunflower, corn, cottonseed, soybean, walnut, and peanut. Tub margarines listing liquid oil as their first ingredient. (1 tsp.). Diet margarines (2 tsp.). Salad dressings made with above oils (1 Tbsp.). Nuts or seeds (2 Tbsp.), and Peanut butter (1 Tbsp.)	Butter, margarine containing more than 2 g. of saturated fat per tablespoon, bacon or meat drippings, lard, salt pork, suet, salad dressings containing sour cream, cream, coconut, chocolate, non-dairy creamers containing hydrogenated fats, hydrogenated vegetable shortening, gravies containing meat drippings.
Other Foods and Beverages	Broth, soups, such as beef noodle, chicken rice, chunky-style turkey noodle, vegetarian, and soups prepared with allowed ingredients.	Cream and other chunky-style soups.
Desserts (Limit according to calorie/carbohydrate needs)	Made from allowable ingredients. Angel food cake (no icing). Gingersnaps, Fig Newton cookies. Fruit flavored gelatin. Sherbet, sorbet, fruit ice. Frozen nonfat or low fat yogurt or ice cream. Cornstarch pudding or tapioca (prepared with skim milk). Non-fat whipped topping.	Products containing whole milk, 2% milk, saturated fats, hydrogenated fats, cocoa butter, coconut, chocolate or egg yolks. Commercial cakes, pies and cookies, including mixes. Ice cream or ice milk. Puddings, custards prepared with saturated fats and egg yolks. Whipped Topping.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Sweets (Limit according to calorie/carbohydrate needs)	Sweetened lemonade, carbonated beverages, sweetened bottled water, fruit punch. Other sweets - as calories allow: candy corn, gumdrops, mints, and hard candy, jam, jelly, honey, sugar or syrup.	Candies containing chocolate, coconut, butter, or other saturated fats.
Alcohol (Limit to one serving daily for women and 2 servings daily for men.)	If calorie restriction desired, avoid or limit to occasional use One serving equals: Beer (12 fl. oz.), bourbon, gin, rum, scotch, tequila, vodka, and whiskey (1 ½ fl. oz for 80 proof spirits), Wine, red or white (4 fl. oz).	Avoid or use only occasionally if calorie restriction is desired or if triglycerides are elevated.
Unlimited Foods (Non-calorie)	Coffee, tea, plain mineral water, decaf-coffee and tea substitutes, sugar-free carbonated beverages, broth (without fat) or bouillon. Sugar substitutes, sugar-free pancake syrup, horseradish, mustard, oil-free salad dressings, dill pickles, taco sauce, vinegar, spices, parsley, garlic, and mint. Unflavored or sugar-free gelatin, junket. Sugar-free jam and jelly(2 tsp.), cocoa powder, unsweetened (1Tbsp.), catsup (1Tbsp.), cranberries, unsweetened (½ cup), rhubarb, unsweetened(½ cup).	Flavored coffees containing cream or saturated fats (cappuccinos).

SAMPLE DAILY MEAL PLAN

BREAKFAST

Orange Juice, $\frac{3}{4}$ cup
Cereal, $\frac{3}{4}$ cup
Whole Wheat Toast, 2 slices
Egg Substitute, 3 ounces
Margarine (liquid oil), 2 tsp.
Jelly, 1 Tbsp.
Milk, Skim, 1 cup
Sugar, 2 tsp.
Coffee/Tea

LUNCH

Vegetable Soup, $\frac{3}{4}$ cup
Saltine Crackers, 4
Roast Beef, lean, 2 ounces
Whole Grain Bread, 2 slices
Tomato Slices, $\frac{1}{2}$ cup
Lettuce Salad, $\frac{1}{2}$ cup
Salad Dressing, fat free, 1 Tbsp.
Mayonnaise, light, 1 Tbsp.
Mustard, 1 tsp.
Apple, 1 medium
Sugar, 2 tsp.
Coffee/Tea

DINNER

Baked Chicken Breast (without the skin), 3 ounces
Baked Potato, 1 medium
Steamed Broccoli, $\frac{1}{2}$ cup
Dinner Roll, 1
Peaches, $\frac{1}{2}$ cup
Angel Food Cake, 1 slice
Sour Cream, fat free, 1 Tbsp.
Margarine (liquid oil), 2 tsp.
Milk, skim, 1 cup
Coffee/Tea

SNACK

Milk, skim, 1 cup
Graham Crackers, 3 squares

The diet as listed in the Sample Meal Plan contains approximately:

Calories	2200	Dietary Fiber	22.5 grams
Protein	109 grams (20%)	Sodium	3100 milligrams
Carbohydrate	322 grams (59%)	Potassium	4100 milligrams
Total Fat	51 grams (21%)	Iron	31 milligrams
Cholesterol	150 milligrams		

If dietary sodium restriction is necessary, please refer to Modification in Sodium Section of the Missouri Diet Manual.

**CALORIES, FAT, SATURATED FAT, AND CHOLESTEROL OF FOOD GROUPS –
APPROXIMATE NUTRIENT ANALYSIS FOR ONE SERVING**

FOOD GROUPS	CALORIES	FAT	SATURATED FAT	CHOLESTEROL
Meat, Poultry, and Fish	55	3	1	26
Eggs	75	5	2	213-220
Dairy Products	90	3	2	11
Fat	45	5	1	--
Breads, Cereals, Pasta, and Starchy Vegetables	80	1	--	--
Vegetables	25	0	--	--
Fruit	60	0	--	--
Other foods and beverages:				
a. Homemade desserts 1 portion = (2 optional foods)	306	6-12	Varies	Varies
b. Sweets (1 optional food)	75	--	--	--
c. Alcohol (1 optional food)	90-150	--	--	--

**CALORIE LEVEL MEAL PLANS FOR TLC DIET
(LIMITED FOR 5 OZ DAILY)**

	CALORIE LEVELS		
FOOD GROUPS	1200	1600	2000
Meat, Poultry, Seafood Group	5 oz.	5 oz.	5 oz.
Eggs (yolks/week)	May consume two egg yolks per week		
Milk and milk products	2	3	3
Fats and Oils	3	5	6
Breads, Cereals, Pasta and Starchy Vegetables	5	5	8
Vegetables	4	4	4
Fruits	3	3	4
Optional Food Servings	0	2	2
(APPROXIMATE NUTRIENT CONTENT)			
Calories	1267	1607	2009
Fat (% of Total Calories)	32%	30%	31%
Saturated Fat (% Total Calories)	5%	7%	8%
Cholesterol	174	159	183

SPECIFIC DYSLIPIDEMIAS

Low HDL Cholesterol

Low HDL cholesterol, defined as <40 mg/dL in men and <50 mg/dL in women, is a significant and independent risk factor for CHD. Higher levels of HDL, ≥ 60 mg/dL, appear to provide a degree of protection. Low HDL cholesterol is a strong independent predictor of CHD. Many of the causes of low HDL are associated with insulin resistance, i.e. elevated triglycerides, overweight and obesity, physical inactivity, and Type 2 diabetes. Other causes include cigarette smoking, very low fat diets (<15% of calories), and certain drugs (e.g. beta-blockers, anabolic steroids, progestational agents). Recommendations that can increase HDL cholesterol are smoking cessation, weight reduction, increased physical activity, and increasing dietary fat intake if it is less than 15% of calories. If triglycerides are not elevated, HDL raising drugs may be considered.

Very High LDL Cholesterol

Defined as >190 mg/dL, very high LDL cholesterol is usually genetic. Early detection is crucial in young adults to help prevent premature CHD. Treatment usually requires both TLC and drug therapy.

High Serum Triglycerides

High triglycerides is an independent risk factor for CHD. Factors contributing to elevated triglycerides include obesity and overweight, physical inactivity, cigarette smoking, excess alcohol, a high carbohydrate diet (>60% of calories), certain diseases (Type 2 diabetes, chronic renal failure, nephrotic syndrome), certain drugs (corticosteroids, estrogens, retinoids, higher doses of beta-adrenergic blocking agents), and genetic factors.

Elevated triglycerides are most often observed in persons with metabolic syndrome (Page 6.15). Partially degraded VLDL, commonly called *remnant lipoproteins*, is triglyceride-rich and is the most readily available measure of atherogenic remnant lipoproteins. VLDL cholesterol can be a secondary target of cholesterol-lowering therapy. VLDL cholesterol combined with LDL cholesterol is termed *non-HDL cholesterol* (total cholesterol minus HDL cholesterol). The goal for non-HDL cholesterol in persons with high serum triglycerides can be set at 30 mg/dL higher than that for LDL cholesterol. See Table 4, page 6.3.

For all persons with high triglycerides, the primary goal is to achieve the individual's target LDL cholesterol level. Further treatment recommendations are to be based on the cause of the high triglycerides and the severity of the elevation.

ATP III Classification of Serum Triglycerides

Recommendations

- | | | |
|-------------------|------------------|--|
| • Normal | <150 mg/dL | |
| • Borderline-high | 150-199 mg/dL | Trim excess calories for weight reduction
Increase physical activity |
| • High | 200-499 mg/dL | Trim excess calories for weight reduction
Increase physical activity
Consider drug therapy |
| • Very high | ≥ 500 mg/dL | Very low fat diet ($\leq 15\%$ of calories)
to prevent pancreatitis
Weight reduction
Physical Activity
Drug Therapy |

Metabolic Syndrome

Metabolic syndrome is a diagnosis given to a combination of cardiovascular disease risk factors that is closely linked to insulin resistance. Excess body fat, particularly abdominal obesity, and physical inactivity are usually contributors to the development of the metabolic syndrome, but some individuals may be genetically predisposed. Diagnosis of the metabolic syndrome is made when three or more of the risk factors shown in Table 7 are present.

Table 7. ATP III Clinical Identification of the Metabolic Syndrome

Risk Factor	Defining Level
Abdominal Obesity*	Waist Circumference**
Men	>102 cm (>40 in)
Women	>88cm (35 in)
Triglycerides	≥150 mg/dL
HDL cholesterol	
Men	<40 mg/dL
Women	<50mg/dL
Blood pressure	≥130/≥85 mmHg
Fasting glucose	≥110 mg/dL

- * Overweight and obesity are associated with insulin resistance and the metabolic syndrome. However, the presence of abdominal obesity is more highly correlated with the metabolic risk factors than is an elevated body mass index (BMI). Therefore, the simple measure of waist circumference is recommended to identify the body weight component of the metabolic syndrome.
- ** Some males can develop multiple metabolic risk factors when the waist circumference is only marginally increased, (e.g., 94-102 cm or 37-39 in). Such men may have a strong genetic contribution to insulin resistance. They should benefit from changes in life habits, similarly to men with categorical increases in waist circumference.

Management of Metabolic Syndrome

Management of the metabolic syndrome is a secondary target of therapy after LDL cholesterol is adequately controlled. Management of the metabolic syndrome involves reducing the underlying causes (i.e. obesity and physical inactivity) and to treat the associated risk factors. Weight reduction and increased physical activity are primary therapies because they will effectively reduce all of the metabolic syndrome risk factors.

Diabetic Dyslipidemia

This atherogenic dyslipidemia (high tryglycerides, low HDL, and small dense LDL) occurs in persons with type 2 diabetes. Therapy goals for lipid control include management of blood sugar levels.

Diabetes is designated as a CHD risk equivalent in ATP III, thus management of dyslipidemia is more aggressive. The LDL cholesterol goal for most persons with diabetes (<100mg/dL) is lower than the person who does not have diabetes. When LDL cholesterol is ≥130, most persons with diabetes will require both TLC and drug therapy.

REFERENCES:

1. AHA Dietary Guidelines Revision 2000: A Statement for Healthcare Professionals from the Nutrition Committee of the American Heart Association. Circulation. 2000;102:2284-2299.
2. Albert CM, Hennekens CH, O'Donnell CJ, Ajani UA, Carey FJ, Willett WC, Riskin JN, Manson JE. Fish consumption and risk of sudden cardiac death. JAMA. 1998;279:23-28.
3. Allison DB, Egan K, Barra LM, Caughman C, Infante M, Heimbach JT. Estimated intakes of trans fatty and other fatty acids in the US population. J Am Diet Assoc. 1999;99: 166-174.
4. American Heart Association Science Advisory and Coordinating Committee. Fiber, lipids, and coronary heart disease. Circulation. 1997;95:2701-2704.
5. American Heart Association Science Advisory and Coordinating Committee. Phytochemicals and cardiovascular disease. Circulation. 1997;95:2591-2593.
6. Brown L, Rosner B, Willett WW, Sacks FM. Cholesterol-lowering effects of dietary fiber: a meta-analysis. Am J of Clin Nutr. 1999;69:30-42.
7. Bunout D, Garrido A, Suazo M, Kauffman R, Venegas P, de la Maza P, Petermann M, Hirsch S. Effects of supplementation with folic acid and antioxidant vitamins on homocysteine levels and LDL oxidation in coronary patients. Nutr. 2000;16:107-110.
8. Daviglus ML, Stamler J, Orenca AJ, Dyer AR, Liu P, et al. Fish consumption and the 30-year risk of fatal myocardial infarction. N Engl J Med. 1997;336:1046-1053.
9. De Lorgeril M, Salen P, Martin JL, Monjaud I, Delaye J, Mamelle N. Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction. Final report of the Lyon Diet Heart Study. Circulation. 1999;99:779-785.
10. FDA approves health claim labeling for foods containing soy protein. J Am Diet Assoc. 2000; 100: 292.
11. Gallagher PC, Mcleady R, Shields DC, Tan KS, McMaster D, Rozen R, Evans A, Graham IM, Whitehead AS. Homocysteine and Risk of Premature Coronary Heart Disease. Circulation. 1996;94:2154-2158.
12. Ginsberg HN, Kris-Etherton P, Dennis B, Elmer PJ, Ershow A, Lefevre M, Pearson T, Roheim P, Ramakrishnan R, Reed R, Stewart K, Stewart P, Phillips K, Anderson N. The effects of reducing saturated fatty acids on plasma lipids and lipoproteins in healthy subjects. Atherosclerosis, Thrombosis, and Vascular Biology. 1998;18:441-449.
13. Gundy, SM. What is the desirable ratio of saturated, polyunsaturated, and monounsaturated fatty acids in the diet? Am J Clin Nutr. 1997;66(suppl):988s-90s.
14. Hallikainen MA, Sarkkinen ES, Uusitupa MI. Plant stanol esters affect serum cholesterol concentrations of hypercholesterolemic men and women in a dose-dependent manner. J Nutrition. 2000;130:767-776.
15. Harris WS. N-3 Fatty acids and serum lipoproteins: human studies. Am J Clin Nutr. 1997;65:1645S-1654S.
16. Howell WH, McNamara DJ, Tosca MA, Smith BT, Gaines JA. Plasma lipid and lipoprotein responses to dietary fat and cholesterol: meta-analysis. Am J Clin Nutr. 1997; 65:1747-1764.
17. Hyperlipidemia Medical Nutrition Therapy Protocol. American Dietetic Association Medical Nutrition Therapy Evidence Based Guides for Practice. American Dietetic Association. 2001.

18. Kris-Etherton PM, Zhao G, Pelkman CL, Fishell VK, Coval SM. Beneficial effects of a diet high in monounsaturated fatty acids on risk factors for cardiovascular disease. Nutr Clin Care. 2000; 3: 153-162.
19. Kris-Etherton PM. Summary of the scientific conference on dietary fatty acids and cardiovascular health: Conference Summary from the Nutrition Committee of the American Heart Association. Circulation. 2001. 103:1034-1039.
20. Kwiterovich P. The effect of dietary fat, antioxidants, and pro-oxidants on blood lipids, lipoproteins, and atherosclerosis. J Am Diet Assoc. 1997;97(suppl):31S-415.
21. Lemaitre RN, Siscovick DS, Raghunathan TE, Weinmann S, Arbogast P, Lin DY. Leisure-time physical activity and the risk of primary cardiac arrest. Arch Intern Med. 1999;159:686-690.
22. Lichtenstein AH, Deckelbaum RJ. AHA Science Advisory. Stanol/sterol ester-containing foods and blood cholesterol levels. A statement for healthcare professionals from the Nutrition Committee of the Council on Nutrition, Physical Activity, and Metabolism of the American Heart Association. Circulation. 2001;103:1177-1179.
23. Ludwig DS, Pereira MA, Kroenke CH, Hilner JE, Van Horn L, Slattery ML, Jacobs DR Jr. Dietary fiber, weight gain, and cardiovascular disease risk factors in young adults. JAMA. 1999; 282:1539-1546.
24. Mason JB, Selhub J. Disease Prevention: Broadening the Definition of Folate Nutrition. Nutrition in Clin Care. 1999;2:82-86.
25. Monsen ER. Dietary reference intakes for the antioxidant nutrients: vitamin C, vitamin E, selenium, and carotenoids. J Am Diet Assoc. 2000;100:637-640.
26. Morrison HI, Douglas S, Desmeules M, Wigle D. Serum folate and risk of fatal coronary heart disease. JAMA. 1996;275(24):1893-1896.
27. National Cholesterol Education Program. Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel II). Circulation. 1994; 89:1333-1445.
28. National Heart, Lung, and Blood Institute National Cholesterol Education Program. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). Available at: <http://www.nhlbi.nih.gov/guidelines/cholesterol/index.htm>.
29. Obarzanek E, Hunsberger SA, Van Horn L, Hartmuller VV, Barton BA, Stevens VJ, Kwiterovich PO, Franklin FA, Kimm SY, Lasser NL, Simons-Morton DG, Laaer RM. Safety of a fat-reduced diet: the Dietary Intervention Study in Children (DISC). Pediatrics. 1997;100:51-59.
30. Oomen CM, Feskens EJ, Rasanen L, Fidanza F, Nissinen AM, Menotti A, Kok FJ, Kromhout D. Fish consumption and coronary heart disease mortality in Finland, Italy, and The Netherlands. Am J Epidemiol. 2000; 151:999-1006.
31. Position of the American Dietetic Association: Health implications of dietary fiber. J Am Diet Assoc. 1997; 97:1157-1159.
32. Rexrode KM, Carey VJ, Hennekens CH, Walters EE, Colditz GA, Stampfer MJ, Willett WC, Manson JE. Abdominal adiposity and coronary heart disease in women. JAMA. 1998;280:1843-1848.
33. Statement on Exercise: Benefits and Recommendations for Physical Activity Programs for all Americans. Circulation. 1996;94:857-862.
34. Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult

Treatment Panel III). Washington, DC: US Dept of Health and Human Services, Public Health Service; 2001. NIH Pub 01-3670.

35. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of the High Blood Cholesterol in Adults. Washington, DC: US Dept of Health and Human Services, Public Health Service; 2001. NIH Pub 01-3095.
36. Von Schacky C, Angerer P, Kothny W, Theisen K, Mudralt. The effect of dietary omega-3 fatty acids on coronary atherosclerosis: a randomized, double-blind, placebo-controlled trial. Ann Intern Med. 1999;130:554-562.
37. Wolk A, Manson JE, Stampfer MJ, Colditz GA, Hu FB, Speizer FE, Hennekens CH, Willett WC. Long-term intake of dietary fiber and decreased risk of coronary heart disease among women. JAMA. 1999;281:1998-2004.

**FATTY ACID AND CHOLESTEROL CONTENT OF SOME
COMMONLY CONSUMED FOODS**

<u>Meat, Poultry and Seafood</u>	Weight gm	Energy Cal	Fat gm	Sat Fatty Acid gm	Mono Fatty Acid gm	Poly Fatty Acid gm	Chol mg
Beef, lean 1oz.	20.0	44.4	2.04	0.80	0.89	.08	18.0
Beef, ground 1 oz (15% Fat, broiled)	20.0	51.2	3.26	1.28	1.43	.12	16.8
Chicken, breast, 3oz No skin, roasted	95	144	3.1	.9	1.1	.7	73
Chicken, leg, 1 ½ oz No skin, roasted	44	76	2.8	.7	.8	.6	40
Turkey, dark meat, 1oz No skin	28	52	2.0	.67	.45	.45	32
Turkey, light meat, 1 oz No skin, roasted	28	40	.9	.28	.2	.3	24
Pork, 1 oz	28	62	3.5	1.2	1.6	.4	27
Shrimp, cooked, 1 oz	28	28	.3	.06	.07	.13	55
Tuna, light, 1 oz Canned in water (drained)	28	37	.1	.2	.07	.03	-
Cod, cooked, 1 oz Dry loaf	28	30	.2	.03	.5	.07	16
Flounder/Sole, Cooked, 1 oz Dry loaf	28	33	.4	.1	.01	.01	19
Salmon, w/bones, 1 oz Canned, drained	28	43	1.6	.4	.53	.43	12
Lamb, lean, 1 oz Roasted	28	53	1.7	.6	.73	.11	29
<u>Egg</u>							
Egg, one whole	50	79	5.6	1.7	2.2	.7	213
<u>Dairy Products</u>							
Milk, whole, 8 oz	244	150	8.2	5.1	-	-	33
Milk, 2% fat, 8 oz	244	121	4.7	2.9	-	-	18
Milk, 1% fat, 8 oz Fluid	244	102	2.6	1.6	.07	1	10
Milk, skim, 8 oz	245	86	0.4	0.3	0.1	-	4
Ice milk, vanilla, 8 oz (4.3 % fat)	131	185	6	3.5	1.6	.2	18
Frozen Yogurt, 8 oz Fruit variety	227	230	2	1.6	.7	.1	10
Cheese, Mozzarella, 1 oz Part Skim	28	72	4.5	2.9	1.4	.1	22
Cheese, Cheddar, 1 oz	28	114	9.4	6.0	2.7	.3	30
Cheese, Cottage, 8 oz 2% fat	226	203	4.4	2.0	1.2	.1	19
Cheese, Cottage, 8 oz 1% fat	226	164	2.3	1.5	1.0	-	10

**FATTY ACID AND CHOLESTEROL CONTENT OF SOME
COMMONLY CONSUMED FOODS**

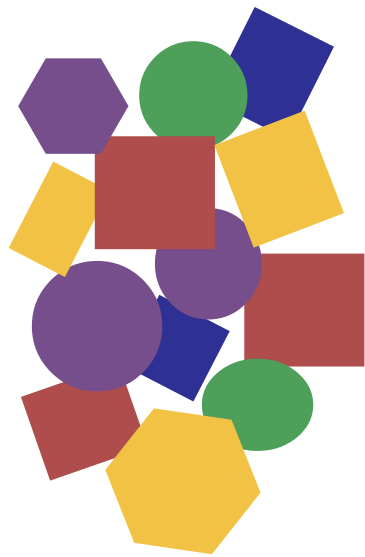
<u>Fats and Oils</u>	Weight gm	Energy Cal	Fat gm	Sat Fatty Acid gm	Mono Fatty Acid gm	Poly Fatty Acid gm	Chol mg
Oil, Safflower, 1 tsp	5	40	4.5	.4	.7	3.4	0
Oil, Corn, 1 tsp	5	40	4.5	.6	1.2	2.7	0
Oil, Soybean/Cottonseed, 1 tsp	5	40	4.5	.8	1.5	2.2	0
Oil, Olive, 1 tsp	5	40	4.5	.6	3.5	.4	0
Oil, Canola, 1 tsp	5	40	4.5	.3	2.7	1.5	0
Mayonnaise, Soy, 1 tsp	5	33	3.6	.5	1.2	1.9	2.6
Commercial							
Margarine, Corn, 1 tsp	5	34	3.8	.7	1.6	1.5	0
Regular, Soft							
Margarine, Corn, 1 tsp	5	34	3.8	.6	2.4	.8	0
Regular, Hard							
Shortening, Vegetable/Soy, 1 tsp	5	40	4.5	.5	1.0	3.0	0
<u>Bread, Cereal, Pasta & Starchy Vegetables</u>							
Bread, White, Soft, 1 slice	24	64	.9	.2	.4	.3	0
Rice, White, cooked, 4 oz	80	85	0	0	0	0	0
Long grain							
Macaroni, Cooked, 4 oz	140	159	.7	.1	.1	.2	0
Tender, hot							
Cereal, Corn Flakes, 1 oz	128	110	1.0	Tr	Tr	Tr	-
Bread, Whole Wheat, soft, 1 slice	25	61	1.1	.4	.4	.3	-
Cereal, Oatmeal, cooked, 3 oz	232	120	2	.4	.8	1.0	0
Cereal, Bran Flakes, 1 oz	28	93	.50	.1	.1	.3	-
<u>Vegetables</u>							
Tomato, raw, red, ripe	123	24	.3	0	Tr	.1	0
Onions, raw, mature, chopped	80	27	.2	0	Tr	.1	0
Tomato juice, canned	182	32	.1	0	Tr	0	0
Cabbage, raw, shredded	35	8	.1	0	Tr	0	0
Carrot, raw, scraped	72	31	.1	0	Tr	.1	0
Tomato, red, canned, whole	120	25	1.0	0	.05	.1	0
Squash, Zucchini, boiled	90	14	.1	0	Tr	0	0
Turnip Greens, boiled	72	15	.2	0	Tr	.1	0
Beans, snap, green, canned, cut	62	22	.2	0	Tr	.1	0
Beans, green, frozen, French	85	26	.2	0	Tr	.1	0
Broccoli, raw	88	24	.4	0	Tr	.2	0
Carrots, scraped, sliced, boiled, drained	146	55	Tr	Tr	Tr	.1	0
Cauliflower, frozen, boiled	90	17	.2	0	Tr	.1	0
Peppers, sweet, raw	50	12	.2	0	Tr	.1	0
Asparagus, boiled, spears	90	22	.3	.1	Tr	.1	0
Beets, canned, sliced	85	27	.1	0	Tr	0	0
Broccoli, frozen, boiled, drained	92	25	.1	0	Tr	.1	0
Onions, mature, boiled, drained	105	29	.2	0	Tr	.1	0
Spinach, leaf, frozen, boiled	95	27	.2	0	Tr	.1	0

**FATTY ACID AND CHOLESTEROL CONTENT OF SOME
COMMONLY CONSUMED FOODS**

	Weight gm	Energy Cal	Fat gm	Sat Fatty Acid gm	Mono Fatty Acid gm	Poly Fatty Acid gm	Chol mg
<u>Fruit</u>							
Bananas, raw, peeled	114	105	.6	.2	Tr	.1	0
Apples, raw, unpeeled	138	81	.5	.1	Tr	.1	0
Oranges, raw, all varieties	140	65	.1	.0	Tr	0	0
Orange Juice, frozen, diluted	240	111	.5	.1	.1	.1	0
Watermelon, raw	160	50	.7	.3	.2	.1	0
Applesauce, canned, unsweetened	122	53	.1	0	Tr	0	0
Applesauce, canned, sweetened	128	97	.2	0	Tr	.1	0
Grapefruit, raw, pink and red	123	37	.1	0	Tr	0	0
Grapes, raw, American type	92	58	.3	.1	Tr	.1	0
Melon, Cantaloupe, raw	160	57	.1	.1	.1	.3	0
Peaches, raw, whole	81	37	.1	0	Tr	0	0
Pears, Bartlett, raw, unpeeled	166	98	.7	0	.1	.2	0
Peaches, canned/water pack	244	58	.1	0	Tr	0	0
Pineapple, canned/juice	250	150	.2	0	Tr	.1	0
Pineapple Juice, canned	250	139	.2	0	Tr	.1	0
Strawberries, raw, whole	149	45	.6	0	.1	.3	0
Grape Juice, canned and bottled	253	155	.2	.1	0	.1	0
Grapefruit Juice, canned, unsweetened	247	93	.2	0	0	.1	0
Lemons, raw, peeled	58	17	Tr	0	Tr	0	0
Melon, Honeydew, raw	100	33	Tr	Tr	Tr	.1	0
Nectarines, raw	136	67	.6	.1	.2	.3	0
Pears, canned/water	244	71	.1	0	Tr	0	0
Pineapple, raw, diced	155	77	.7	0	.1	.3	0
Plums, Prune type, raw	66	36	.4	0	.3	.1	0
Strawberries, frozen, sliced, unsweetened	149	52	.2	0	Tr	.1	0

REFERENCES:

1. American Heart Association, Dietary Treatment of Hypercholesterolemia for Patients, 1988.
2. Bowes and Church, Food Values of Portions Commonly Used, 16 ed., Jean, A.T. Pennington, JBL Pincott Co., 1994.
3. Taber's Encyclopedic Medical Dictionary, 16 ed., Thomas, 1989.
4. Understanding Nutrition, 6th ed., Whitney and Rolfes, 1993.



Modifications In Sodium

RESTRICTED SODIUM DIETS

PURPOSE

The purpose of a sodium-restricted meal plan is to limit the dietary intake of sodium to manage hypertension and to promote the loss of excess fluids in ascites and edema.

NUTRITIONAL ADEQUACY

Sodium restricted diets meet the Recommended Dietary Allowances when the types and amounts of foods suggested are included each day. The recommended amount of iron will not be met for certain age groups unless iron-rich foods are served frequently. Meal plans with daily sodium intakes less than 1,000 mg may be inadequate in calcium due to the restriction of milk and milk products. This level is not recommended for long-term use.

INDICATIONS FOR USE

A sodium restriction should be used to manage cardiovascular disease, acute and chronic renal disease, essential hypertension, severe cardiac failure, and ascites due to liver disease. A moderate sodium restriction (3,000 mg) may be used for the general population, especially those who are sodium-sensitive.

DIET PRINCIPLES

Foods containing sodium are limited on a sodium restricted diet, and the amount of sodium restricted depends on the level of restriction. The average daily sodium intake of the normal diet varies widely depending on the individual food habits and food selections. Sodium intake of the normal diet ranges from 3 grams to 10+ grams per day. Approximately 3 grams (3,000 milligrams) or less is the recommended amount of many health agencies for the normal diet.

Sodium restricted diets should be prescribed in terms of the milligrams, grams, or milliequivalents of sodium desired. Various degrees of sodium restriction are prescribed, but the degree of restriction depends on the amount of edema, the severity of cardiac or vascular disease, and the type of drug therapy. Terms such as "salt-free" and "low salt" are confusing and indefinite and should not be used.

Generally, a sodium restriction range is between 1,000 - 3,000 milligrams but some allow 4,000 – 5,000 milligrams of sodium per day. However, it is common in some instances for the physician to order a more restricted diet (500 - 1,000 milligrams of sodium) while the patient is hospitalized. Long-term use at this range is not recommended because it is not nutritionally adequate. Sometimes fluid restrictions are necessary and in other instances may not be necessary if the patient is adhering to a sodium restricted diet. Often alcohol and caffeine are limited because they may cause an increased heart rate and arrhythmias. A high potassium diet may be indicated if the patient is taking diuretics.

Sodium is naturally present in most foods and is added to many foods as salt and other sodium compounds through processing and preparation. Fruits contain very little natural sodium, while meats, poultry, fish, eggs and milk have relatively large amounts. Most vegetables, cereals and grains contain very little sodium unless it is added in processing. Sodium compounds that are added during processing and cooking, other than salt, includes such items as preservatives, monosodium glutamate, baking soda and baking powder.

Depending on the area, water supplies contain various amounts of sodium. The local water departments should be able to provide the sodium content in the water supply. Sodium in the water supply is expressed as parts per million (ppm). The ppm number represents milligrams of sodium in one liter of water. If the water contains 20 milligrams or less of sodium to each liter, it is acceptable. If it is over this amount, persons receiving 1,000 mg sodium or less per day should use distilled water for drinking and preparing foods. In areas where the water supply is high in sodium, locally bottled carbonated beverages, wines and other alcohol beverages may contribute appreciably to the diet. Softened water is not

recommended for those on a restricted sodium diet. Some drugs such as antacids and seltzer-containing drugs may also contain sodium. Also, toothpaste and chewing tobacco may contain sodium and should be included in the total sodium allowance for the day.

Salt substitute should not be used without consulting the patient's physician.

To convert a specified weight of sodium chloride (salt) to sodium, multiply by 0.39.

To convert a specific weight of sodium to sodium chloride, multiply by 2.54.

NO ADDED SALT. A regular diet with no restrictions on meat or milk. Regular bread and butter or margarine are used. Foods very high in sodium or highly salted foods are restricted. May use 1/2 tsp salt per day in cooking or at the table.

4,000 mg SODIUM (174 mEq). There is no restriction on milk or meat. Regular bread and butter or margarine are used. Foods very high in sodium or highly salted foods are restricted. May use up to 1/2 tsp salt per day in cooking or at the table.

3,000 mg SODIUM (130 mEq). Smoked, koshered, or salted meats, pickled vegetables, luncheon meats, high sodium processed foods and beverages, salad dressings, and commercially softened water should not be used. 1/4 tsp salt per day in cooking or at the table.

2,000 mg SODIUM (87 mEq). Processed and prepared foods and beverages high in sodium, pickled foods, salted cheeses, fats and oils, salted breads, cereals, pasta, and starchy vegetables should not be used. A variety of low sodium cereals (cereals containing 35 mg sodium or less) should only be used, such as Shredded Wheat and puffed cereals. Instant hot cereals, pastas, and rice mixes should not be used unless they contain 35 mg of sodium or less. Milk and milk products should be limited to 16 oz per day. All labels of canned and instant grain products should be read carefully for high sodium sources. Salt should not be used in the preparation of foods or at the table.

1,000 mg SODIUM (45 mEq). Processed and prepared foods and beverages high in sodium should not be used. Regular breads should be limited to two servings per day. Regular canned foods, many frozen foods, deli foods, fast foods, regular salad dressings, margarines, and cheeses should not be used. Milk and milk products should be limited to 16 oz per day. Salt should not be used in food preparation or at the table.

500 mg SODIUM (22 mEq). Use the 1,000 mg sodium diet guidelines with the following restrictions: Milk and milk products should be limited to 8 oz per day and meats to 6 oz per day. One egg per day may be substituted for 1 oz meat. Use only low-sodium breads and do not use Sherbet and flavored gelatin. Canned or processed foods containing salt and vegetables high in natural sodium should not be used. Use only distilled water for cooking and drinking. Mustard greens, chard, dandelion greens, white turnips, celery, spinach, rutabagas, peas, kale, beets, beet greens, and carrots should not be used. Salt should not be used in food preparation or at the table. A 500 mg sodium restriction diet should only be used under the supervision of a physician and only for a short period of time.

250 mg SODIUM (11 mEq). Use the 500 mg sodium diet guidelines but use low-sodium milk instead of regular milk. A 250 mg sodium restriction diet should only be used under the supervision of a physician and only for a short period of time.

SODIUM MODIFICATIONS FOR THE AMERICAN HEART ASSOCIATION DIET

To lower blood pressure through sodium restriction, most people need to limit intake of sodium from three sources:

1. Processed foods provide about 67% of the sodium in the American diet.
2. Salt added in food preparation and at the table provides about 18% of the sodium in the American diet.
3. Naturally occurring sodium in foods and water provide about 15% of the sodium in the American diet.

The following modifications to the Step One and Step Two eating patterns are for all calorie levels and designed to help the patient limit sodium intake to approximately 2,000 milligrams per day. Sodium intake should be no more than 3,000 milligrams (3 grams) per day.

1. Meats/Poultry/Fish:

No more than 6 oz cooked lean meat, poultry, or fish. Fish should be unpickled, canned in water, unsalted and rinsed. Meats should be unprocessed or fresh cooked or canned without salt and rinsed. No more than 3 to 4 egg yolks a week should be eaten and egg whites may be eaten in unlimited amounts.

2. Milk Products:

2 or more servings per day for adults 24 years and older and children 2-10 years old. 3-4 servings per day for ages 11-24 and women who are pregnant or breastfeeding. Cottage cheese should be unsalted, low-fat or dry curd. Other cheeses should be those reduced in fat and sodium (no more than 5 grams fat and 150 milligrams sodium per ounce). Processed cheeses should be avoided.

3. Breads, Cereals, Pasta and Starchy Vegetables:

6 or more servings per day are recommended. Choose crackers and snacks that have no added salt or unsalted tops. Egg yolks used in cooking quick breads should be counted as part of the daily allowance. Cereals, pasta and rice cooked without salt should be used. Instant or ready-to-eat types of cereals (unless they contain 35 mg of sodium or less) pasta, and rice should be avoided. Choose soups that are low in sodium, or prepare homemade soup using low sodium products and no added salt.

4. Vegetables and Fruits:

5 or more servings per day. Should use fresh, frozen, or unsalted canned vegetables. Omit pickles, sauerkraut, pickled olives, and other pickled vegetables. Tomato juice and canned tomatoes should be unsalted, or low sodium varieties.

5. Fats and Oils:

No more than a total of 5-8 servings per day. Fats should be unsalted.

6. Optional Foods:

Desserts: Should be made with low-sodium baking powder and unsalted margarine. Salt should be omitted from the recipe.

7. Free Foods:

Broth or bouillon, ketchup, mustard, salad dressings should all be low sodium.

Refer to eating patterns which have been adapted at all caloric levels to provide approximately 2,000 milligrams sodium.

4,000 MILLIGRAMS OR 174 MILLIEQUIVALENTS SODIUM DIET
(4 Grams Sodium or 10 Grams Sodium Chloride Salt)

There is no restriction of protein foods such as milk or meats. Regular bread and butter or margarine are used. Foods which are restricted are those which are very high in sodium or highly salted foods. Up to 1/2 tsp salt may be used each day.

FOOD GROUPS	RECOMMENDED	NOT RECOMMENDED
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts (6 oz only)	May be fresh, frozen or canned. Prepared any way. Includes meat, fish, eggs, poultry, dried beans, and dried peas. Rinsed canned tuna or salmon.	No smoked or salted meats (frankfurters, chipped or corned beef, ham, kosher meats, salt pork, luncheon meats, sausage, and smoked tongue). No salted or smoked fish (anchovies, salted cod, herring, sardines).
Milk, Yogurt and Cheese (2 to 3 servings)	May be whole, 2%, skim, buttermilk or evaporated. May be used as a beverage or in cooking. Dry milk may be used in cooking. May have cocoa, custards and puddings, ice cream and yogurt. May have natural cheese (cheddar, Swiss, brick and mozzarella). Limit cottage cheese to 1/2 cup per day.	No prepared cheese or cheese spreads, except low sodium. No Roquefort cheese.
Bread, Cereal, Rice and Pasta (6 to 11 servings)	May have all kinds, enriched or whole grain. May include macaroni, noodles, spaghetti, and rice.	No salted pretzels or salted popcorn. No breads, rolls or crackers with salt toppings.
Fruits (2 to 4 servings)	All fresh, frozen, and canned fruits.	
Vegetables (3 to 5 servings)	All fresh, frozen, and canned vegetables; however, fresh or frozen are recommended over canned. Tomato and V-8 Juice should be limited to 1/2 cup per day unless low sodium.	No sauerkraut, pickled vegetables, or other vegetables prepared in brine. No vegetables frozen in a sauce or seasoned with ham, bacon, or salt pork.
Fats and Oils (5-8 servings per day)	Butter, margarine, shortening, vegetable oils, salad dressing, salad oil, and light, sour and heavy cream.	No snack dips made with instant soup mixes or processed cheese.
Other (As desired)	All kinds (cake, cobbler, cookies, gelatin desserts, pie and sherbet). Homemade cream or vegetable soup prepared without salt and made with allowed vegetables, reduced sodium canned soups and broths.	Regular canned or dehydrated soups (no more than once per week). No dried soup mixes and no commercially prepared foods and dinners containing more than 800 mg sodium (Na). No bouillon unless low sodium.

SAMPLE MEAL PLAN
(Select from foods which are to be served every day)

BREAKFAST	LUNCH	DINNER
Orange Juice, 3/4 cup	Vegetable Soup, 1 cup	Baked Chicken, 3 ounces
Whole Grain Cereal, 3/4 cup	Roast Beef, 2 ounces	Baked Potato, 1 small
Fruit, 1/2 cup	Whole Wheat Bread,	Whole Grain Roll, 1
Egg, 1	regular, 2 slices	Green Beans, 1/2 cup
Whole Wheat Bread,	Tossed Salad, 1 cup	Canned Peaches, 1/2 cup
regular, 2 slices	Italian Dressing, regular,	Angel Food Cake, 1/12 slice
Margarine,	1 Tbsp	2% Milk, 1 cup
regular, 2 tsp	Apple, 1 medium	Margarine, 1 tsp
Jelly, 1 Tbsp	Graham Crackers, 3	Coffee/Tea
Sugar, 1 tsp	Mayonnaise, 1 tsp	
2 % Milk, 1 cup	Mustard	
Coffee/Tea	Catsup	
	Coffee/Tea	

No Salt on Tray

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2296	Dietary Fiber	30 grams
Protein	102 grams (18%)	Sodium	3513 milligrams
Fat	65 grams (25%)	Potassium	4374 milligrams
Carbohydrate	60 grams (60%)	Iron	20.4 milligrams

**3,000 MILLIGRAMS OR 130 MILLIEQUIVALENTS SODIUM DIET
(3 Grams Sodium or 7.5 Grams Sodium Chloride Salt)**

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts (6 oz. only)	Fresh or frozen meat, poultry, and most shellfish; canned tuna or salmon, rinsed; egg and egg substitutes; cottage cheese, drained; regular yogurt; regular cheese; ricotta and cream cheese (2 oz daily), low-sodium cheese as desired; regular peanut butter (3 times weekly); dried peas and beans; frozen dinners with <600 mg sodium.	No canned, salted, smoked, cured, koshered meats, fish or poultry, including chipped or corned beef, frankfurters, ham, cold cuts, hot dogs, bacon, sausage, salted sardines, anchovies, salted cod and herring; pickled meats; frozen breaded meats; pickled eggs; processed cheese spreads and sauces, salted nuts.
Milk, Yogurt and Cheese (2 servings daily)	Including that used in cooking. Milk, buttermilk (limit to 1 cup daily); custards and puddings made from allowed milk and egg; eggnog.	
Bread, Cereal, Rice and Pasta (6 or more servings)	Enriched white, wheat, rye and pumpernickel bread, hard rolls and dinner rolls, biscuits, muffins, cornbread, pancakes, and waffles; most dry and hot cereals; unsalted crackers and bread sticks. Enriched rice, barley, noodles, spaghetti, macaroni and other pastas; homemade bread stuffings.	No breads, rolls, and crackers with salted tops and no instant cereals. No commercially prepared rice or pasta mixes or bread stuffings.
Fruits (2 to 4 servings)	All fresh, frozen or canned fruits are allowed.	
Vegetables (3 to 5 servings)	Prepared without salt. All fresh and frozen vegetables; canned, drained vegetables. White or sweet potatoes and squash.	No sauerkraut, pickled vegetables, and other prepared in brine. No vegetables seasoned with ham, bacon, or salt pork. No commercially prepared potatoes.
Fats and Oils (5-8 servings per day)	Butter or margarine; vegetable oils; low-sodium salad dressings, other salad dressings in limited amounts; light, sour, and heavy cream.	Salad dressings containing bacon, fat, bacon bits, and salt pork; snack dips made with instant soup mixes or prepared cheeses.
Desserts	All	None

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Beverages and Fluids (As desired)	Carbonated beverages, all fruit juices: low-sodium salt-free vegetable juices: regular vegetable or tomato juices (limit to 1/2 cup daily). Coffee, decaffeinated coffee, coffee substitute, and tea.	Regular vegetable or tomato juices used in excessive amounts, commercially softened water used for drink or cooking.
Soups	Commercial canned and dehydrated soups, broths, and bouillon (once per week); homemade broths and soups without added salt and made with allowed vegetables; reduced-sodium canned soups and broths.	Canned or dehydrated regular soups (no more than once per week).
Miscellaneous	May use 1/4 tsp salt daily in cooking or at the table. Salt substitute may be used if approved by the physician. As desired: spices, herbs, pepper, lemon or lime juice, hot pepper sauce, low sodium soy sauce. Unsalted popcorn, potato chips, tortilla chips and pretzels.	No seasoning made with salt: such as garlic salt, celery salt, onion salt, and seasoning salt. No sea salt, rock salt, kosher salt, no monosodium glutamate, meat tenderizer, regular soy sauce, teriyaki sauce, most flavored vinegars, regular snack chips, olives, Worcestershire sauce.

2,000 MILLIGRAMS OR 87 MILLIEQUIVALENTS SODIUM DIET
(2 Grams Sodium or 7.5 Grams Sodium Chloride Salt)

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts (6 oz only)	Fresh or frozen meat, poultry, and most shellfish. Tuna, salmon, and peanut butter must be low-sodium. May have one egg without salt to replace one ounce meat. Low sodium cheese such as low sodium ricotta and cream cheese and regular yogurt, dried peas and beans and frozen dinners (>500 mg sodium) may be used.	No canned, salted or smoked meats such as chipped or corned beef, ham, frankfurters, kosher meats, luncheon meats, salt pork, sausage and smoked tongue. No canned, salted, or smoked fish such as anchovies, salted cod, herring, and sardines. No canned tuna or salmon except low sodium. No crabs, brains, kidney, and peanut butter unless low-sodium peanut butter.
Milk, Yogurt, and Cheese (2 servings only)	Including that used in cooking. Whole, 2%, skim, or evaporated. Dry milk may be used in cooking. Also, unsalted custards and puddings made from milk and egg allowance. One serving of ice cream and unsalted cottage cheese. Buttermilk should be limited to 1 cup per week.	Chocolate milk, instant cocoa mixes, Dutch process cocoa, milkshakes and malted milk should not be used.
Bread*, Cereals, Rice, and Pasta (6 or more servings)	Cooked cereal should be prepared without salt. Puffed rice, puffed wheat, Shredded Wheat and other low-sodium dry cereals that contain <35 mg sodium should be used. May use unsalted crackers and breadsticks and low-sodium or homemade bread crumbs. May use plain macaroni, noodles, spaghetti, or rice prepared without salt. May have rye, pumpernickel bread, hard roll and dinner roll, muffin, cornbread, pancake, and waffle. Should use no more than 4 servings of regular bread.	No quick-cooking or instant cereals containing a sodium compound. No bread, rolls, and crackers with salted tops, commercial bread stuffings, biscuit mix, regular bread crumbs or cracker crumbs.
Fruits (2-4 servings)	Most fresh, frozen, and canned fruits.	No fruits processed with salt or sodium-containing compounds.
Vitamin C Source (1 serving)	Should be citrus fruit or equivalent source of vitamin C. Includes all fruits prepared without salt.	No crystallized or glazed fruit and maraschino cherries.

SAMPLE MEAL PLAN
(Select from foods which are to be served every day.)

BREAKFAST	LUNCH	DINNER
Orange Juice, 3/4 cup	Vegetable Soup, 1 cup	Baked Chicken, unsalted, 3 ounces
Whole Grain Cereal, 3/4 cup	Crackers, 4	Baked Potato, 1 small
Egg, 1	Roast Beef, unsalted, 2 ounces	Whole Grain Roll, 1
Whole Wheat Bread, regular, 1 slice	Whole Wheat Bread, 2 slices	Green Beans, low-sodium, 1/2 cup
Banana, 1/2	Tossed Salad	Canned Peaches, 1/2 cup
Margarine, regular, 2 tsp	Italian Dressing, 1 Tbsp	Angel Food Cake, 1/2 slice
2% Milk, 1 cup	Apple, 1 medium	Margarine, 1 tsp
Jelly, 1 Tbsp	Graham Crackers, 3	2% Milk, 1 cup
Sugar, 1 tsp	Mayonnaise, 1 tsp	Coffee/Tea
Coffee/Tea	Mustard	
	Catsup	
	Coffee/Tea	

No Salt on Tray

The plan can be individualized to meet nutritional needs.

The diet as listed in Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2050		
Protein	97 grams (19%)	Sodium	2906 milligrams
Carbohydrate	289 grams (56%)	Potassium	4144 milligrams
Total Fat	63 grams (28%)		

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Vegetables Dark Green or Orange (1 serving)	Vegetables should be fresh, frozen, and low-sodium canned vegetables. White or sweet potatoes and squash are allowed.	Should avoid all canned vegetables, unless low-sodium. No sauerkraut or vegetables prepared in brine. No frozen vegetables in sauces and no vegetables seasoned with ham, bacon, or salt pork.
All Others (3 or more servings)	Includes all other vegetables prepared without salt.	
Fats and Oils (In moderation)	May use only 4 tsp of regular salted butter or salted margarine, and only 1 Tbsp French dressing, mayonnaise or Thousand Island dressing. Can substitute 1 strip bacon for 2 Tbsp regular butter or margarine. May use vegetable oils and unsalted salad dressings, light, sour, and heavy cream.	No bacon (unless properly substituted), salted commercial salad dressing or mayonnaise (except 1 Tbsp as allowed). No regular salad dressing containing bacon fat, bacon bits, or salt pork. No snack dips made with instant soup mixes or processed cheese.
Other (As desired)	Fruit pies or cobbler prepared without salt. One serving only of the following: plain cake or cookies (limit to two), gelatin dessert or sherbet. Homemade cream of vegetable soup prepared without salt and low-sodium canned soup.	No desserts prepared with salt and no commercial desserts and dessert mixes. No canned soups unless low-sodium, bouillon cubes, dried soup mixes, and convenient foods. No commercially prepared frozen foods and dinners.
Beverages and Fluids (As desired)	Carbonated beverages, coffee, coffee substitute, decaffeinated coffee, and tea. May have all fruit juices, low-sodium and salt-free tomato and vegetable juices.	No prepared beverage mixes including fruit-flavored powder, fountain beverages, and Gatorade. No regular vegetable or tomato juice. No commercially softened water used for cooking or drinking
Miscellaneous (As desired)	Allspice, basil, bay leaves, celery seed, chili powder, cinnamon, cloves, cocoa, curry, coconut, dill, garlic, garlic powder, ginger, mace, dry mustard powder, nutmeg, onion powder, oregano, paprika, parsley, pepper, poultry seasoning, sage, thyme, turmeric, caraway, poppy and sesame seeds, lemon juice, vinegar, flavoring extracts, cream of tartar, yeast unsalted nuts, candy, honey, molasses, white and brown sugar, jelly, jam, low-sodium soy sauce, hot pepper sauce and ketchup, chili sauce and mustard. Fresh ground horseradish, unsalted tortilla chips, pretzels, potato chips and popcorn.	No salt, baking soda, baking powder, celery salt, garlic salt, onion salt, mixed seasoned salts, monosodium glutamate, ketchup chili sauce, barbecue sauce, prepared mustard, prepared horseradish, soy sauce, Worcestershire sauce, meat extracts, gravies, tenderizers, olives, pickles, relishes, salted nuts, black strap molasses, teriyaki sauce, steak sauce, and most flavored vinegars. No regular condiments or salted snacks.

*In place of 3 slices of regular bread you may use one of the following:

1/4 tsp salt	2 slices regular bread and 2 tsp regular butter or margarine
2 oz regular canned tuna	2 slices regular bread and 1 slice of Bacon
4 oz regular canned salmon	1 cup buttermilk
1/2 cup cottage cheese	

SAMPLE MEAL PLAN

(Select from foods which are to be served every day.)

BREAKFAST

Orange Juice, 3/4 cup
Whole Grain Cereal,
low-sodium, 3/4 cup
Egg, 1
Whole Wheat Bread, 1 slice
Banana, 1/2
Margarine, regular, 2 tsp
2% Milk, 1 cup
Jelly, 1 Tbsp
Sugar, 1 tsp
Coffee/Tea

LUNCH

Vegetable Soup, low-sodium,
1 cup
Crackers, unsalted, 4
Roast Beef, unsalted,
2 ounces
Whole Wheat Bread
(Regular), 1 slice
Tossed Salad
Italian Dressing, unsalted,
1 Tbsp
Apple, 1 medium
Graham Crackers, 3
Mayonnaise, low-sodium,
1 tsp
Coffee/Tea

DINNER

Baked Chicken, unsalted,
3 ounces
Baked Potato, 1 small
Whole Grain Roll, 1
Green Beans, low-sodium,
1/2 cup
Canned Peaches, 1/2 cup
Angel Food Cake, 1/12 slice
Margarine (Regular), 1 tsp
2% Milk, 1 cup
Coffee/Tea

No Salt on Tray

The plan can be individualized to meet nutritional needs.

The diet as listed in Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2129		
Protein	101 grams (20%)	Sodium	1965 milligrams
Carbohydrate	299 grams (61 %)	Potassium	4229 milligrams
Total Fat	47 grams (22%)		

**1,000 MILLIGRAMS OR 44 MILLIEQUIVALENTS SODIUM DIET
(1 Gram Sodium or 2.5 Grams Sodium Chloride Salt)**

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish Dry Beans, Eggs, and Nuts (5 oz. only)	Any fresh or frozen meat, poultry, or fish prepared without salt, or low-sodium peanut butter. May have one egg instead of one oz. of meat prepared without salt.	Canned, salted or smoked meat (chipped or corned beef, frankfurters, ham, kosher meats, luncheon meats, salt pork, sausage, smoked tongue); canned, salted or smoked fish (anchovies, salted cod, herring, sardines); canned tuna or salmon except low-sodium; crabs, scallops; brain; kidney; peanut butter except low-sodium peanut butter.
Milk, Yogurt and Cheese (2 cups only)	Including that used in cooking Whole, 2%, or skim. Unsalted custards and puddings made from milk and egg allowance. Unsalted cottage cheese.	Commercial buttermilk, instant cocoa mixes, Dutch process cocoa, milk shakes, malted milk. Cheese except unsalted cottage cheese
Breads*, Cereals, Rice, and Pasta (6 or more servings)	Cooked cereal prepared with out salt. Puffed rice, puffed wheat, Shredded Wheat and other low-sodium dry cereals; or plain macaroni, noodles, spaghetti or rice prepared without salt. 3 slices may be regular salted bread, enriched white or whole grain. $\frac{3}{4}$ cup regular corn flakes, 40% bran flakes, or 2 graham crackers (2 $\frac{1}{2}$ in. squares) may be substituted for one slice of regular bread.	All bakery goods prepared with baking powder, salt or soda; quick cooking or instant cereals containing a sodium compound; dry cereals other than those listed; prepared mixes; salted crackers; self-rising flour; pretzels; salted popcorn
Fruits (2 or more servings)	Most fresh, frozen, and canned fruit.	Canned, dried or frozen fruits which have salt or sodium benzoate added; crystallized or glazed fruit; maraschino cherries.
Vitamin C Source (1 serving)	Should be a citrus fruit or equivalent source of vitamin C.	

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Vegetables Dark Green or Orange (1 serving)	Fresh, frozen or low-sodium canned, prepared without salt. Read labels to be sure that no salt or sodium compounds have been used. The following vegetables are naturally-or due to processing-fairly high in sodium. One 1/2 cup serving of the following may be chosen daily: beets, carrots, collards, dandelion greens, kale, mixed frozen vegetables, mustard greens, frozen black eye peas, spinach or turnip greens.	All canned vegetables unless low-sodium. Fresh, frozen or canned artichokes, beet greens, celery, chard, hominy and sauerkraut; frozen lima beans (baby and Fordhook), frozen green peas, frozen peas and carrots. Potato chips, instant and convenience potato products.
All others (2 or more servings)	Includes all other fruits and vegetables prepared without salt.	
Fats and Oils (Unsalted fats may be used as desired)	Unsalted butter, unsalted vegetable fat, low-sodium salad dressings, cream (limit to 2 Tbsp). One of the following may be served: 1 tsp salted butter or margarine, 2 tsp cream substitute, 4 Tbsp sour cream or 2 tsp mayonnaise.	Bacon, salted commercial salad dressing or mayonnaise, salt pork, salted butter or salted margarine.
Other (As desired)	Gelatin desserts made from plain gelatin powder; fruit pies made with unsalted crust; 1 serving may be 1/2 cup of sherbet. Salt-free broth or cream soup made from milk allowance and allowed vegetables; low-sodium canned soups.	Desserts prepared with salt or baking soda, any commercial dessert and dessert mixes. Canned soup, unless low-sodium soup made without salt; bouillon cubes, dried soup mixes. Convenience foods, commercially prepared frozen foods and dinners.
Beverages and Fluids (As desired)	Coffee, coffee substitute, decaffeinated coffee, tea.	Carbonated beverages; prepared Beverage mixes including fruit Flavored powder, fountain Beverages; Gatorade.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>
Miscellaneous (As desired)	Allspice, basil, bay leaves, celery seed, chili powder, cinnamon, cloves, cocoa, curry, coconut, dill, garlic, garlic powder, ginger, mace, dry mustard powder, nutmeg, onion powder, oregano, paprika, parsley, pepper, poultry seasoning, sage, thyme, turmeric, caraway, poppy and sesame seeds, lemon juice, vinegar, flavoring extracts, cream of tartar, yeast, unsalted nuts, candy, honey, molasses, white and brown sugar, jelly, jam, low-sodium ketchup, chili sauce and mustard. Fresh ground horseradish, unsalted tortilla chips, pretzels, potato chips and popcorn.	No salt, baking soda, baking powder, celery salt, garlic salt, onion salt, mixed seasoned salts, monosodium glutamate, ketchup, chili sauce, barbeque sauce, prepared mustard, prepared horseradish, soy sauce, Worcestershire sauce, meat extracts, gravies, tenderizers, olives, pickles, relishes, salted nuts, black strap molasses, teriyaki sauce, steak sauce, and most flavored vinegars. No regular condiments or salted snacks.

*In place of 3 slices of regular bread you may use one of the following:

- 1/4 tsp salt 2 slices regular bread and 2 tsp regular butter
- 2 oz regular canned tuna or margarine
- 4 oz regular canned salmon 2 slices regular bread and 1 slice bacon
- 1/2 cup cottage cheese 1 cup buttermilk

SAMPLE MEAL PLAN

(Select from foods which are to be served every day.)

BREAKFAST

Orange Juice, 3/4 cup
Whole Grain Cereal,
low-sodium, 3/4 cup
Egg, 1
Whole Wheat Bread,
regular, 1 slice
Banana, 1/2
Margarine, low-sodium,
1 tsp.
2% Milk, 1 cup
Jelly, 1 Tbsp.
Sugar, 1 tsp.
Coffee/Tea

LUNCH

Vegetable Soup,
low-sodium, 1 cup Crackers,
unsalted, 4 Roast Beef, unsalted
2 ounces
Whole Wheat Bread,
unsalted, 1 slice Tossed Salad
Italian Dressing,
unsalted, 1 Tbsp. Apple, 1
medium Graham Crackers, 1
Mayonnaise, low-sodium,
1 tsp.
Mustard
Catsup
Coffee/Tea

DINNER

Baked Chicken, unsalted,
2 ounces
Baked Potato, 1 small
Bread, low-sodium, 1 slice
Green Beans, low-sodium,
1/2 cup
Canned Peaches, 1/2 cup
Angel Food Cake, 1/12 slice
Margarine, low-sodium,
1 tsp.
2% Milk, 1 cup
Jelly, 1 Tbsp.
Sugar, 1 tsp.
Coffee/Tea

No Salt on Tray

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	1948	Sodium	1042 milligrams
Protein	96 grams (20%)	Potassium	4218 milligrams
Carbohydrate	299 grams (61 %)	Iron	15 milligrams
Fat	45 grams (21 %)		

SODIUM EXCHANGES

May substitute for ONE Slice of Regular Bread the following:

- 1 Slice of Cake, any kind
- 2 Large or 5 small Cookies, any kind
- 4 Unsalted Crackers
- 1 Small Sweet Roll or Doughnut
- 1/2 Large or 1 Small Hamburger Bun, Frankfurter Bun, or other Plain Roll
- 1 Cup Milk (in addition to amount allowed)
- 4 Squares Graham Crackers
- 1/2 Cup Pudding (from regular mix) or Custard
- 1 Cup Ice Cream

In place of 3 Slices of Regular Bread you may use one of the following:

- 1/4 tsp. salt
- 2 oz. Regular Canned Tuna
- 4 oz. Regular Canned Salmon
- 2 Slices Regular Bread and 2 tsp. regular butter or margarine
- 2 Slices Regular Bread and 1 Slice Bacon
- 1 Cup Buttermilk

USE OF SODIUM POINTS FOR SODIUM RESTRICTED DIETS

Some individuals prefer the use of the sodium point system for planning a sodium restricted diet. They believe it offers more flexibility by allowing higher sodium foods as long as the total amount of dietary sodium does not exceed the restriction level. Special attention, however, must be placed on assuring that the diet is nutritionally adequate.

Sodium point values are assigned to each food based on sodium content. One sodium point is 1 milliequivalent or 23 milligrams of sodium. Sodium points are totaled for all foods chosen for the day. This total should not exceed the sodium level prescribed. The table below converts sodium milligrams into points.

CONVERSION OF MILLIGRAMS OF SODIUM TO SODIUM POINTS

Milligrams of Sodium in Diet Order	Milliequivalents	Sodium Points in Diet in One Day
500	22	22
1000	44	44
2000	87	87
3000	130	130
4000	174	174

One sodium point is one milliequivalent (mEq) or 23 milligrams (mg) of sodium.

SODIUM LABELING

Definitions for sodium labeling terms for processed foods.

Low Sodium	140 mg. or less of sodium per serving.
Very Low Sodium	34 mg. or less of sodium per serving.
Sodium Free	Less than 5 mg. of sodium per serving.
Reduced Sodium	At least 75% less sodium than before reduction.
Unsalted or No Added Salt	No salt was used or added in processing to a product that is normally processed with salt. Product may contain sodium.

SODIUM POINTS OF FOODS			
FOOD GROUP	FOOD	AMOUNT	SODIUM POINTS
Milk, Yogurt, and Cheese	Cheese:		
	Cheddar or Colby	1 ounce	9
	Cottage, Creamed *	1/2 cup	20
	Cream*	2 Tablespoons	4
	Process American or Swiss*	1 ounce	18
	Mozzarella*	1 ounce	5
	Parmesan, grated	1 Tablespoon	4
	Spread*	1 ounce	17
	Swiss*	1 ounce	3
	Cream:		
	Half and Half, Heavy Whipping	3 Tablespoons	1
	Sour, Commercial	3 Tablespoons	1
	Ice Cream	1/2 cup	2
	Iced Milk	1/2 cup	2
	Milk:		
	Buttermilk*	1 cup	16
	Chocolate	1 cup	7
	Evaporated Skim	1/2 cup	6
	Evaporated Whole	1/2 cup	6
	Dry Milk	1/3 cup	5
	Skim	1 cup	5
	2%	1 cup	5
	Whole	1 cup	5
	Sweetened Condensed Milk	1 cup	17
	Whipped Topping	Any amount	0
	Yogurt, Plain with Added Milk Solids	1 cup	7
	Yogurt, Fruited Varieties	1 cup	6
Vegetables	Regular, Salted, Canned Vegetables or Fresh and Frozen Cooked in Salted Water*	1/2 cup	10
	Unsalted, Fresh, Frozen or Canned unless otherwise specified:		
	Asparagus, cooked	1/2 cup	0
	Beans:		
	Baked, no pork, canned	1/3 cup	15
	Dry, cooked, unsalted	1/2 cup	0
	Green, Lima, frozen, cooked unsalted	1/2 cup	5
	Green, cooked	1/2 cup	0
	Beets, cooked	1/2 cup	2
	Broccoli, cooked	1 large stalk	0
		2 large stalks	1
	Brussels Sprouts, cooked	1/2 cup	1
	Cabbage, cooked	1/2 cup	1
	Carrots:		
	Cooked	1/2 cup	1
	Raw	3 medium sticks	1
	Cauliflower, cooked	1 cup	0
	Celery, raw	1 large stalk	2
	Corn, unsalted	1/2 cup	0
	Cucumber, raw	1 medium	0
	Eggplant, cooked	1/2 cup	0

FOOD GROUPS	FOOD	AMOUNT	SODIUM POINTS
Vegetables (Cont'd)	Greens, cooked:		
	Collards, Dandelion, Kale		
	Mustard, Spinach, Turnip	1/2 cup	2
	Lettuce, raw	4 large leaves	0
	Mixed Vegetables,		
	*Frozen, cooked	1/2 cup	2
	Mushrooms:		
	Canned, regular	1/2 cup	17
	Fresh	10 small	0
	Okra, cooked	1/2 cup	0
	Onions:		
	Cooked	1/2 cup	0
	Green, raw	5	0
	Chard, raw	1/2 cup	6
	Peas:		
	Black-eyed, frozen	1/2 cup	3
	Green, cooked	1/2 cup	0
	Green, frozen, cooked	1/2 cup	5
	Peas and Carrots, frozen	1/2 cup	4
	Pepper, green, raw	1 shell	1
	Potato:		
	Sweet or Yams, unsalted	1/4 cup or 1/2 small	0
	White, mashed, baked, boiled, unsalted	1 small or 1/2 cup (2 in. diam.)	0
	White, frozen, fries	1/2 cup	1
	White, *mashed from mix	1/2 cup	11
	Potato Chips*	1 oz. (15 chips)	16
	Pumpkin, cooked	1/2 cup	0
	Radishes, raw	8-10 medium	1
	Rhubarb, raw	1 cup cubed	0
	Rutabaga, cooked	1/2 cup	0
	Sauerkraut*	1/3 cup	25
	Squash:		
	Summer or Winter, cooked	1/2 cup	0
	Succotash, frozen, cooked	1/2 cup	1
	Tomato:		
	Cooked	1/2 cup	0
	Raw	1 medium	0
	Tomato Juice, regular, canned	1/2 cup	11
	Tomato, Paste (with salt)	6 oz. can	57
	Tomato Paste (without salt)	6 oz. can	4
	Tomato Sauce, regular canned	1 cup	52
	Turnips, cooked	1/2 cup	1
	Vegetable Juice:		
	Regular, canned	1/2 cup	16
	Unsalted, canned	1/2 cup	2
Fruit	Fruits and Fruit Juices (not listed below)	Any amount	0
	Cantaloupe	1/2 (6 in. diam.)	1
	Honeydew Melon	1/8 (7 in. diam.)	1
	Raisins	1 cup	1

FOOD GROUPS	FOOD	AMOUNT	SODIUM POINTS
Bread, Cereal, Rice, and Pasta	Bread:		
	Biscuit (from mix)	1 (2 in. diam.)	12
	Biscuit (canned)	1 (2 in. diam.)	12
	Biscuit (frozen)	1 (2 in. diam.)	16
	Bread, regular, salted	1 slice	5
	Bread, unsalted	1 slice	0
	Bun, hamburger	1 (1 1/2 oz.)	9
	Cornbread *	1 (2 1/2 square)	15
	English Muffin	1	12
	Muffin, plain	1 (3 in. diam.)	8
	Dinner Roll	1 small	6
	Rusk	1 in. thick	1
	Hot Cereal:		
	Cooked, unsalted	1/2 cup	0
	Quick, cooked, unsalted	1/2 cup	2
	Cooked, salted according to directions	1/2 cup	10
	Instant	1 packet (3/4 cup)	10
	Ready-to-eat Cereal		
	All Bran*	1/3 cup	14
	Bran Flakes*	3/4 cup	12
	Cheerios*	3/4 cup	9
	Cornflakes *	3/4 cup	10
	Grapenuts*	1/4 cup	10
	Raisin Bran*	3/4 cup	12
	Rice Krispies*	3/4 cup	9
	Rice, puffed	1 1/2 cup	0
	Shredded Wheat	3/4 cup	0
	Special K*	3/4 cup	8
	Sugar Crisp	3/4 cup	1
	Wheat Germ	3 tablespoons	0
	Wheaties*	3/4 cup	12
	Cornmeal, dry	1/2 cup	0
	Crackers:		
	Butter:		
	Round*	2 (1 7/8 in. diam.)	3
	Rectangle*	1 (2 1/2 x 1 3/8 in.)	2
	Cheese *	10 (1 in. square)	5
	Graham	1 (2 1/2 in. square)	2
	Melba Toast, rectangle	3	5
	Saltines:		
	Regular*	5 (1 7/8 in. square)	7
	Unsalted top	5	5
	Rye Wafer*	2 (3 1/2 x 1 7/8 in.)	5
	Zwieback	1 (3 1/2 x 1 1/2 in.)	1
	Flour	2 1/2 tablespoons	0
	Self-rising *	2 1/2 tablespoons	9
	Grits, cooked, unsalted	1/2 cup	0
	Macaroni, cooked, unsalted	1/2 cup	0
	Noodles, cooked, unsalted	1/2 cup	0

FOOD GROUPS	FOOD	AMOUNT	SODIUM POINTS
Bread, Cereal, Rice and Pasta (Cont'd)	Pancakes	4 in. cake	10
	Popcorn, popped	2 cup	0
	Pretzels, * small sticks	10	2
	Rice, cooked, unsalted	1/2 cup	0
	Spaghetti, cooked, unsalted	1/2 cup	0
	Stuffing*, prepared with mix	1/2 cup	28
Meat, Poultry, Fish, Dried Beans, Eggs and Nuts	Egg:		
	Whole, medium or large	1	3
	White, medium or large	1	2
	Fish:		
	Cod, Haddock, Halibut	1 ounce	1
	Crabmeat*, canned	1/4 cup	17
	Lobster, cooked	2 ounces	5
	Oysters:		
	Fresh	2-3 medium	1
	Frozen*	2-3 mediums	8
	Salmon:		
	Regular*, canned	1 ounce	7
	Unsalted, canned	1 ounce	1
	Sardines*, canned	3 3/4 oz. can	33
	Scallops, fresh or frozen	1 ounce	3
	Shrimp:		
	Fresh, frozen, or canned, unsalted	5 small	2
	Tuna:		
	Regular, canned	1 ounce	10
	Unsalted, canned	1 ounce	1
	Meat:		
	Fresh, uncured:		
	Beef, Lamb, Pork		
	Poultry, Veal	1 ounce	1
	Cured, smoked or salted:		
	Chipped, dried beef *	1 ounce	53
	Corned beef *	1 ounce	21
	Frankfurter *	1 (10/pound)	22
	Chicken or Turkey	1 (10/pound)	27
	Ham*	1 ounce	16
	Lunchmeat*	1 slice	15
	Sausage*		
	Link	2 links	15
	Pattie	1 ounce	15
	Liver	1 ounce	2
	Sweetbreads	1 ounce	1
	Peanuts, roasted, salted	1 ounce	5
	Peanut Butter:		
	Regular, salted	2 tablespoons	8
	Unsalted	2 tablespoons	0
	Nuts, unsalted	Any amount	0

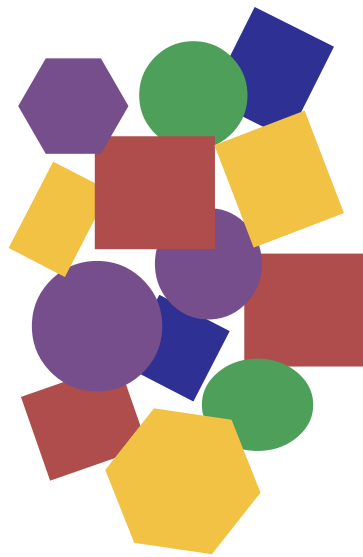
FOOD GROUPS	FOOD	AMOUNT	SODIUM POINTS
Fats, Oils, and Sweets	Bacon *	1 slice	4
	Butter or Margarine		
	Regular	1 teaspoon	2
	Unsalted	Any amount	0
	Nuts, unsalted	Any amount	0
	Oil or cooking fat	Any amount	0
	Olives:		
	Green*	5 (1 x 3/4 in.)	20
	Ripe*	5 (1 x 3/4 in.)	7
	Salad Dressing:		
	Blue Cheese*	1 Tablespoon	8
	French*	1 Tablespoon	10
	Italian*	1 Tablespoon	10
	Mayonnaise	1 teaspoon	1
	Salad Dressing Mayonnaise type	1 Tablespoon	4
	Thousand Island*	1 Tablespoon	6
	Tartar Sauce*	1 Tablespoon	4
	Imitation Bacon Bits*	1 Tablespoon	10
	Baking Powder*	1 teaspoon	14
	Baking Soda *	1 teaspoon	41
	Beer	12 ounces	1
	Bouillon Granules*	1 teaspoon	21
	Bouillon Cube*	1	42
	Cake:		
	Angel Food	1/12 cake	6
	Chocolate*, from mix, iced	1/12 cake	20
	Cupcake*	1	6
	Pound Cake	1/2 in slice	2
	Snackin' Cake*	1/9 pkg.	11
	Sponge Cake	1/12 cake	5
	White or Yellow*		
	from mix, iced	1/12 cake	16
	Candy:		
	Chocolate, milk	1 ounce	1
	Chocolate, semisweet	1 ounce	0
	Fudge	1 in. cube	2
	Hard, gums and jellies	1 ounce	0
	Cookies:		
	Sandwich type	1 (2 in. diam.)	2
	Vanilla Wafers	3	1
	Custard	1/2 cup	4
	Doughnut:		
	Cake-type *	1 (3 1/4 in. diam.)	9
	Yeast-raised	1 (3 3/4 in. diam.)	4
	Gelatin Dessert	1/2 cup	3
	Herbs	Any amount	0
	Honey	5 Tablespoons	0
	Horseradish, prepared	4 teaspoons	1
	Jelly or Jam	5 Tablespoons	0

FOOD GROUPS	FOOD	AMOUNT	SODIUM POINTS
Fats, Oils, and Sweets (Cont'd)	Malted milk powder	1 Tablespoon	2
	Molasses:		
	Blackstrap	1 Tablespoon	1
	Light	1 Tablespoon	0
	Pie*:		
	Fruit pie, 2 crust	1/8 (9 in. pie)	15
	Pumpkin	1/8 (9 in. pie)	11
	Pudding:		
	Canned*	1/2 cup	9
	Home recipe	1/2 cup	7
	Mix, cooked*	1/2 cup	9
	Mix, instant*	1/2 cup	17
	Rennet Dessert, home recipe	1/2 cup	5
	Salt	1/4 teaspoon	24
	Sherbet	1/2 cup	1
	Soft Drinks:		
	Cola, Lemon-Lime	12 ounces	1
	Diet	12 ounces	2
	Sugar, powered or granulated	1 Tablespoon	0
	Syrup:		
	Corn and table blends	2 Tablespoons	1
	Maple	1 Tablespoon	0
Miscellaneous	Ketchup*	1 Tablespoon	8
	Chili Powder (containing salt)	1 Tablespoon	4
	Chili Sauce*	1/4 cup	30
	Chocolate, baking	1 square (1 oz.)	0
	Chocolate, syrup	2 Tablespoons	1
	Cocoa, dry (not Dutch Processed)	2 Tablespoons	0
	Coffee, Tea	Any Amount	0
	Mustard, prepared	1 teaspoon	3
	Pickles*:		
	Dill slices	1 1/4 in thick)	4
	Dill Spears	1 (6 in. long)	16
	Sweet Gerkins	1 (2 1/2 in long)	4
	Sweet Relish	1 Tablespoon	5
	Soup*:		
	Canned, condensed, reconstituted	10 ounces	47
	Dehydrated, reconstituted	8 ounces	30
	Soy sauce*	1 Tablespoon	57
	Spices	Any amount	0
	Vinegar	Any amount	0
	Wine	6 ounces	0
	Worcestershire Sauce*	1 Tablespoon	11

* High and variable sodium content. Use in moderation only.

REFERENCES:

1. National High Blood Pressure Education Program, National Heart, Lung, and Blood Institute, U.S. Department of Health and Human Services, Public Health Service, National Institute of Health. The 1993 Report of the Joint National Committee on Detection, Education, Evaluation and Treatment of High Blood Pressure, Washington, D.C.: U.S Government Printing Office, 1993. NIH Publication 93-1088.
2. Zeman, E.A. *Clinical Nutrition and Dietetics*, New York, N.Y.: MacMillian Publishing Co., 1991.
3. Williams, S.R., *Basic Nutrition and Diet Therapy*, St. Louis, Mo.: Times/Mosby College Publishing, 1989.
4. American Heart Association. *A Handbook for Counselors*: Chapter on Treatment of High Blood Pressure and High Blood Cholesterol, 1993.
5. The Expert Panel, Grundy, S.M. (Chairman); The American Heart Association. Second Report of the *National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults*. Dallas, TX American Heart Association Printing Office, 1993.
6. American Dietetic Association, *Manual of Clinical Dietetics*, 6th Edition, 2000.



Nutrition Support

ENTERAL NUTRITION

Enteral nutrition feedings require the utilization and absorption of nutrients through the gastrointestinal (GI) tract. There are two types of enteral feedings:

1. oral supplements;
2. tube feedings.

Oral supplements can be offered to patients unable to achieve an adequate oral intake with food alone. They are used in addition to meals or as meal replacements. When a person is unable to meet their nutrient needs orally, it should be considered if nutrition support is appropriate. Factors to consider when deciding whether to provide nutrition support may include the degree of malnutrition present, the length of time the patient will be unable to meet needs, current clinical factors that may increase their nutrient needs, and any expected negative consequences to the patient from not meeting their needs (i.e., wound healing be impaired). If nutrition support is deemed appropriate, tube feedings are preferred to parenteral feeding, which bypasses the GI tract.

Enteral feedings provide a source of nutrition, in liquid form, that will easily pass through a feeding tube. Tube feedings are the preferred method of feeding for those who 1) are unable to meet their nutritional needs via oral intake; 2) have a (at least partially) functioning GI tract. Additionally, consideration should be given to 3) malnourished patients unable to eat greater than 5-7 days. 4) normally nourished patients unable to eat greater than 7-9 days.

Tube feedings are preferred over Total Parenteral Nutrition (TPN) when the gut is functional for the following reasons:

1. Enteral nutrition maintains the integrity of the gut, where TPN does not.
2. Enteral nutrition is safer than TPN. Patients receiving TPN run a greater risk of developing sepsis or electrolyte imbalances.
3. Cost. Enteral feedings are less expensive than TPN and require less laboratory monitoring.

Enteral formulas can be commercially prepared, modular, or made from a mixture of foods served in a normal diet.

Commercially prepared formulas offer several advantages. They: 1) are sterile until opened; 2) are uniformly viscous and flow easily through a tube; 3) save time in preparation; 4) are of a known composition; 5) many can be purchased in small containers for single feedings and stored at room temperature until needed; 6) many tube feeding products come in prepackaged “ready to hang” containers. These only need to be shaken, spiked, and hung. A pre-filled tube feeding system will minimize contamination due to handling that can occur when bags are filled with a canned product.

Modular formulas are prepared from components or “modules” – carbohydrates, protein, fat, water, vitamins, and minerals. Patients on fluid restrictions or those with hepatic or renal failure may benefit from the use of a modular formula. Modular formulas are more labor intensive, resulting in greater cost.

Another type of formula known as elemental requires little or no digestion, is absorbed readily in the gut leaving very little residue for excretion. Elemental formulas can be given orally or through a feeding tube.

SELECTING A FORMULA

When selecting a formula, consider the following:

1. The functioning of the gastrointestinal system;
2. The types of protein, carbohydrate, fat, and fiber in the formula as related to the patients digestive and absorptive capacity;
3. Calorie and protein content of the formula;
4. The ability of the formula, taken in amounts tolerated, to meet the patients needs;
5. The vitamin, mineral, and electrolyte content of the formula;
6. The viscosity of the formula in relation to the type of tubing needed;
7. Cost.

The availability of tube feeding products continues to expand. Products are constantly being developed, and/or reformulated to improve the product. In order to stay current, it is recommended that you consult your manufacturer's specifications. Please refer to package labels for the most accurate ingredient levels.

TUBE FEEDING SITES

The type of feeding tube and its placement depends on the patient's medical status, nutritional status, and estimated length of time that the feeding tube will be needed.

Length of Access - A feeding tube can be classified either as nasoenteric or a tube enterostomy. A nasoenteric tube is inserted through the nasal passage into the stomach (nasogastric), duodenum (nasoduodenal), or jejunum (nasojejunal). These are preferred for short term (less than 6-8 week) access. For longer access (more than 6-8 weeks), gastrostomy and jejunostomy tubes are surgically placed to the stomach or jejunum, respectively. A Percutaneous Endoscopic Gastrostomy (PEG) offers the advantage of not requiring general anesthesia for placement. Jejunal feedings may be considered for shorter than 6 week feedings if they are to be used for early postoperative feeding, since there is no ileus in the jejunum following surgery and these feedings can be started as early as in the recovery room.

Site of Access - Generally speaking, it is preferable to feed as high up the GI tract as the patient can tolerate. However, avoiding the use of the stomach may be recommended if the patient has high risk for pulmonary aspiration of gastric contents, delayed gastric emptying, or upper GI obstruction, stricture or fistula. In these cases, bypassing the affected area is recommended. Feeding to the jejunum may require use of partially predigested or elemental formulas, since many of the enzymes of digestion have been bypassed.

A nasogastric (NG) tube is used for the medically stable patient in need of nutritional support; not at risk for pulmonary aspiration of gastric contents; without intractable vomiting, gastroesophageal reflux, gastrointestinal obstruction, or gastric ileus.

The nasoduodenal and nasojejunal tubes are indicated for patients with diseases involving the stomach, gastroparesis, or those with the potential for pulmonary aspiration of gastric contents.

As stated, the gastrostomy tube is often indicated for long-term tube placement. There must be normal gastric and duodenal emptying. A jejunostomy tube facilitates early post-op enteral nutrition. Those benefiting from a jejunostomy include: those with the potential for pulmonary aspiration; those with an obstruction, stricture, or fistula in the upper GI tract.

ADMINISTRATION AND DELIVERY OF FEEDING

1. Continuous drip: This method of delivery uses a pump or gravity drip to ensure a constant, steady rate. The small intestine cannot tolerate sudden changes in the rate of infusions. Therefore, the continuous drip method is required when feeding into the duodenum or jejunum.

A pump is most often used in hospitalized patients, and is recommended for greater accuracy.

Isotonic formulas can be started at full strength 25-50 ml/hour. Hypertonic formulas (500 mOsm or greater) may be started at half strength 25-50 ml/hour or full strength 15-25 ml/hour. Diluting the formula delays meeting feeding goals, but may be needed initially with hypertonic formulas.

The rate of feeding should be advanced until the desired volume is achieved and then the strength increased. The rate and strength should never be advanced at the same time.

2. Intermittent feedings: These types of feedings are delivered by slow gravity drip, with up to 300 ml of formula being infused over 30-60 minutes. Four to eight equal feedings are provided daily, consisting of 250-300 ml of formula followed by 25-60 ml of water (these volumes should be based on individual assessment of a patient's nutrient and fluid needs). Additional water can be provided as needed to meet the patient's fluid needs.

Intermittent feedings require a period of adaptation before full volume and strength can be tolerated.

This method of feedings is often used for home patients and nursing home residents to allow for greater mobility.

3. Bolus feedings: These feedings are administered through a gastrostomy tube, feeding directly into the stomach. The feedings are administered by gravity over a short period of time. A feeding pump is not required. The gut rests between feedings making this the most physiologic method of administration. Bolus feedings are a good choice for those patients going home or to extended care facilities, because it allows greater freedom and mobility.

4. Cyclic feedings: Cyclic feedings are continuous feedings consolidated into 10-12 hours cyclic infusions. The feedings are often administered at night, allowing the patient to have an appetite and to eat during the day. This method of feeding allows the patient greater freedom and mobility.

GENERAL RULES FOR ADMINISTRATION OF TUBE FEEDINGS

1. Check tube placement prior to the administration of the tube feeding, or any time the tube becomes dislodged. Methods of checking tube placement include:

- a. X-ray – any time the tube becomes dislodged.
- b. Withdraw stomach contents; may need to verify by checking pH.
- c. Auscultate over stomach while injecting air.
- d. Mark tube exit site and monitor for any change in length.

2. Gastric residual should be checked prior to each intermittent feeding. If greater than 100cc of feeding is still present, or more than twice the hourly feeding rate, the feeding should be postponed. The residual may be returned to the patient. Returning the feeding to the patient will avoid the loss of nutrients, gastric juices, and electrolytes. Withholding the residual may be indicated if GI intolerance is severe.

3. The tube feeding formula should be given at room temperature to avoid discomfort. Feedings can be administered chilled if infused by continuous drip. Once a feeding has been prepared or a container opened, it should be covered, labeled with the time, date, and patient's name and stored in the refrigerator, then discarded if not used within 24 hours. Warming a solution may result in destruction of water-soluble vitamins, coagulation of proteins, clogging of nasogastric tubes or increased bacterial contamination.

4. To prevent bacterial contamination:

- a. strict sanitary conditions must be maintained at all times during the preparation, storage, handling and administration of tube feedings. Hazard Analysis Critical Control Points (HACCP) principals should be applied.
- b. Wash hands before handling enteral feeding products.
- c. Do not hang greater than eight (8) hours of feeding at one time. A new supply of formula should never be added to existing formula. If "ready to hang" formulas are used, the hanging time is 24-36 hours if the container has not been opened. Check manufacturers recommendations for hang times.
- d. Rinse feeding bag and tubing with water before adding fresh product. The extension tubing administration set and bag should be changed daily.

5. The head of the bed should be elevated at least 30 degrees while receiving tube feedings, and the patient should not be flat for approximately one hour after each feeding. Patients receiving continuous tube feedings should have the head of their bed elevated at all times.

6. Administer tube feedings slowly at first for better patient tolerance. Refer to manufacturer's recommendations for specific product administration guidelines.

7. It is often not necessary to dilute enteral formulas, especially those with an osmolality of 350-500 mOsm/kg. Diluting the formula delays the provision of adequate nutrition to the patient.

The starting rate and the speed at which goal rate is achieved depends on the patient's medical condition, length of time since the gastrointestinal tract has been used, and demonstrated tolerance during rate advancement. Most patients can be started between 10-50 cc/hr and increased by 25 to 50 cc/hr each 4-12 hours. The goal rate can often be achieved in a stable adult patient in 24-72 hours. In this case you might start the feeding rate at 50-60 cc and advance 10-25 cc every 4-6 hours until the goal rate is achieved. If the enteral feeding is not tolerated, decrease the rate 10-25 cc or return to the previous rate tolerated. Slowly increase the rate until the goal rate is achieved.

8. Flush the tubing with 20-50 ml warm water after each intermittent or bolus feeding, or when hanging a new bag of continuous feeding to clear the tubing and prevent clogging. If the tube becomes clogged, the tube should be flushed, using a syringe, with 30-50 ml of warm water.

9. If medications are not to be administered through the feeding tube, use liquid medications. If liquid medications are not available, consult a pharmacist before crushing or diluting any medications. Some medications are pharmacologically altered by mechanical manipulation. Prior to and following the administration of the medicine, flush the tube with 20 ml of water to prevent clogging.

10. When adding formula to the feeding bag/container, indicate on the bag or container the date, time, and amount of formula added. "Ready to hang" containers should include the date and time the formula was administered.

INITIAL MONITORING OF TUBE FEEDINGS

- 1) Tube placement confirmation prior to administration of continuous feeding prior to each intermittent feeding.
- 2) Weigh patient three times per week. Once the tube feeding goal rate is achieved and tolerated by the patient and desired weight is achieved, the patient can be weighed monthly.
- 3) Record daily intake and output.
- 4) Check gastric residuals every four hours prior to each intermittent feeding. (Not required for small bowel feedings).
- 5) Daily record of bowel movements and consistency.
- 6) Record tolerance to feeding.
- 7) Urine glucose and acetone or accu-checks (every shift/every six hours) until maximal tube feeding rate is established. Patients with diabetes or undergoing steroid therapy should have their glucose tested daily.
- 8) Serum electrolytes and blood count (2-3 times/week or weekly).
- 9) Weekly chemical profiles.
- 10) Weekly nitrogen balance (where available).
- 11) Weekly reassessment of nutritional parameters, with appropriate adjustments in calories and protein as needed.

MONITORING TUBE FEEDINGS – LONG TERM STABLE ENTERAL PATIENTS

- 1) Tube placement confirmation prior to administration of continuous feeding or prior to each intermittent feeding.
- 2) Weigh patient weekly. Once the tube feeding goal rate is achieved and tolerated by the patient and desired weight is achieved, the patient can be weighed monthly.
- 3) Record daily intake and output.
- 4) Check gastric residuals every 4-8 hours or prior to each intermittent feeding.
- 5) Daily record of bowel movements and consistency.
- 6) Record tolerance to feeding.
- 7) Glucose testing every 6 months for non-diabetic patients; daily for diabetic patients.
- 8) Serum electrolytes, BUN, creatinine every 6 months.
- 9) Complete chemical profile every 6 months.

- 10) Ongoing reassessment of nutritional parameters, with appropriate adjustments in calories and protein as needed.

<u>COMPLICATIONS</u>	<u>POSSIBLE CAUSES</u>	<u>PREVENTION/TREATMENT</u>
I. <u>Mechanical</u>		
Aspiration	Patient lying flat	Elevate head of bed 30-45 degrees during and after feeding.
	Decreased gag reflex	Feed into duodenum or jejunum.
	Gastroesophageal reflux	Use small-bore feeding tubes. Large bore tubes reduce the competence of the lower esophageal sphincter.
		Keep head of bed elevated at 30-45 degrees.
		Check tube placement.
	Delayed gastric emptying	Monitor gastric residual. Reduce or discontinue narcotics. Use low fat formula. Administer at room temperature. Try intermittent feeding schedule. Use a prokinetic agent.
	Gastroparesis	Decrease infusion rate or change to more concentrated formula to decrease volume and rate.
		Advance tube into small intestine.
		Administer formula at room temperature.
Tube Obstruction	Thickened formula residue. Insufficient irrigation. Improper crushing of medications.	Flush the tube with 20-50 ml warm water before and after each bolus feeding; every 6-8 hours for continuous feedings whenever the tube is disconnected or stopped; before and after administering medications. Use liquid medications.

COMPLICATIONS**POSSIBLE CAUSES****PREVENTION/TREATMENT****II. GI****Diarrhea**

Bolus feeding. Rapid administration, volume.

Decrease rate of administration and/ decrease strength for 12-24 hours.

Hyperosmolar formula

Start feedings at low/dilute rate and increase gradually.

Use isotonic formula.

Decreased bulk

Select fiber containing formula.

Add soluble fiber (banana flakes) or insoluble fiber (psyllum) to medication regimen.

Hypoalbuminemia (alb. <2.5g/L)

Use elemental formula.

Protein energy malnutrition

Use isotonic formula to allow the intestine to adapt to re-feeding.

Lactose intolerance

Choose lactose free formula.

Fat malabsorption

Close low fat formula or MCT-containing formula.

Intestinal atrophy

Increase rate of infusion slowly. Based on tolerance, adjust rate as needed to avoid aggravation of diarrhea.

Use continuous feeding method.

Medications

Evaluate types of medications administered and possibility for change.

Bacterial contamination

Use sterile techniques when handling/administering formula.

Hang solutions at room temperature no longer than 8-12 hours.

Antibiotic induced diarrhea

Attempt to avoid long term use of antibiotics as possible. Repopulate normal flora with products such as Lactinex granules.

<u>COMPLICATIONS</u>	<u>POSSIBLE CAUSES</u>	<u>PREVENTION/TREATMENT</u>
II. <u>GI, continued</u>		
Nausea/vomiting Stop feeding immediately when vomiting occurs to prevent aspiration.	Rapid delivery rate	Decrease rate and advance as tolerated.
	Delayed gastric emptying	Stop feeding for 2 hours and check residuals.
	Lactose or fat intolerance	Choose lactose free, or low fat formula.
	GI obstruction	Stop feeding.
	Patient position	Turn patient on right side to aid in passage of gastric contents through the pylorus.
Constipation	Insufficient fluid intake	Determine patients fluid needs and provide free water.
	Inadequate fiber	Choose high fiber formula or provide free water.
	Inactivity	Encourage ambulation.
	GI obstruction	Stop feeding.
III. <u>Metabolic</u>		
Dehydration	Inadequate fluid intake or excess losses	Accurate assessment and meeting of fluid needs. Provide additional free water. Monitor weights.
	Lack of free water	Monitor fluid intake and output, electrolytes, BUN to creatinine ratio.
	High osmolality of formula	Change or dilute formula.
Over-hydration	Rapid re-feeding	Decrease rate of feeding. Assess fluid status daily.
	Fluid overload	Restrict free water. Monitor intake and output daily. Change to a concentrated formula.

<u>COMPLICATIONS</u>	<u>POSSIBLE CAUSES</u>	<u>PREVENTION/TREATMENT</u>
III. <u>Metabolic, continued</u>		
Hyperglycemia	Inadequate insulin production	Decrease rate of feeding. Provide insulin or oral hypoglycemic agent. Monitor serum and urine glucose, ketones.
	Carbohydrate content of formula	Change to a formula with less carbohydrate, more fat. Formulas with fiber may be beneficial.
Hypophosphatemia	Re-feeding Syndrome	Replenish phosphorus levels before re-feeding.
	Insulin administration	Monitor serum phosphorus levels daily, until repleted, then weekly.
Hypernatremia	Inadequate fluid intake	Add free water.
	Excessive fluid losses	Monitor intake and output of fluids.
Hyponatremia	Inadequate sodium intake	Supplement sodium intake. Evaluate fluid status.
	Fluid overload	Restrict fluids. Monitor intake and output daily.
Hyperkalemia	Excessive K intake	Decrease K intake.
	Renal insufficiency	Assess renal function. Monitor serum K levels.
Hypokalemia	Re-feeding Syndrome	Supplement K intake.
	Excessive fluid losses	Monitor serum K levels.
	Diuretic therapy	Supplement K as needed.

FLUID/FLUID NEEDS.

Water balance is achieved when intake equals output. Sources of water for the tube fed patient consist of: water in the formula, water flushes, and any intravenous fluids received.

Most one calorie per ml formulas contain 80-85% free water. Calorically dense formulas (1.5 kcal/ml or greater) contain less, approximately 70-77% free water.

To determine fluid needs for the normal adult or child, the following equations may be used.

Adults: 1 ml/per calorie fed

or

25-55 years of age	35 ml/kg body weight/24 hours
--------------------	-------------------------------

56-65 years of age	30 ml/kg body weight/24 hours
--------------------	-------------------------------

> 65 years of age	25 ml/kg body weight/24 hours
-------------------	-------------------------------

Children: 1.5 ml/per calorie fed

or

1 year	120-135 ml/kg body weight/24 hours
--------	------------------------------------

2 years	115-125 ml/kg body weight/24 hours
---------	------------------------------------

4 years	100-110 ml/kg body weight/24 hours
---------	------------------------------------

6 years	90-100 ml/kg body weight/24 hours
---------	-----------------------------------

PARENTERAL NUTRITION

Parenteral nutrition is the administration of nutrients directly into the body's circulation. Parenteral nutrition is used only when the gastrointestinal tract cannot be utilized. There are two major types of parenteral nutrition:

1. peripheral parenteral nutrition (PPN);
2. total parenteral nutrition (TPN).

PERIPHERAL PARENTERAL NUTRITION

PPN is administered through a peripheral vein, therefore the solution must be isotonic or slightly hypertonic to avoid vein collapse or phlebitis. PPN solutions are intended for short-term use, less than 14 days. The primary goal of these solutions is to provide adequate calories and nitrogen to preserve the somatic and visceral protein stores in those persons who are not hyper-metabolic but are unable to meet their nutrient needs orally.

I. Indications for use

1. NPO status, but expected to resume enteral intake in 7-10 days.
2. Mild to moderate malnutrition.
3. Normal or mildly elevated metabolic rate.
4. No organ failure necessitating a fluid restriction.
5. Used as a supplement to oral feedings in those patients with gastrointestinal problems who cannot meet their nutritional requirements completely by oral or enteral intake.

II. Composition

5 - 10% dextrose, (ProcalAmine uses glycerol as a primary calorie source)
3 - 15% crystalline amino acids
10 - 20% lipids, not to exceed 2.5 g fat/kg body wt./24 hrs
Vitamins, minerals, and electrolytes added as needed

The osmolarity of the PPN solution should be less than 900 mOsm/L to prevent phlebitis.

III. Monitoring

1. Observe for signs of peripheral vein intolerance at the catheter site.
2. Fluid balance - daily I & O's.
3. Daily weights.
4. Lipid clearance - measure serum triglycerides.
5. Electrolytes - sodium, potassium, chloride, magnesium, and phosphorus.

PERIPHERAL PROTEIN SPARING

Peripheral parenteral nutrition formulas are designed for short term use (7-14 days) for those patients who are not hypermetabolic. The goal of the formula is to accelerate and maximize the normal adaptation to starvation. The formulas help to conserve protein stores and improve nitrogen balance. Standard formulas are comprised of 3-4% amino acids in sterile water, with $\frac{1}{4}$ - $\frac{1}{2}$ normal saline, and 10-20 mEq K per liter. Water-soluble vitamins are added to the formula in appropriate amounts. The formula is isotonic.

FORMULA NAMES

Parenteral nutrition formulas are known by many names. Listed below are other names which parenteral nutrition solutions are often referred to:

Peripheral Formulas

PPN – peripheral parenteral nutrition

PVN – peripheral venous nutrition

Central Vein Formulas

TPN – total parenteral nutrition

CPN – central parenteral nutrition

CVN – central venous nutrition

“Hyperal” – hyperalimentation

Standard Amino Acid Solutions

Travasol

Novanine

Aminosyn

FreAmine VII

ProcalAmine

Pre-Mixed Products For Central And Peripheral Vein Administration

Nutrimix

Quick Mix

Clinimix

TOTAL PARENTERAL NUTRITION

TPN is administered into a central vein (i.e., superior vena cava, subclavian, internal jugular, or femoral veins). TPN provides complete nutrition support (carbohydrate, protein, lipid, vitamins, and minerals) directly into the bloodstream, bypassing the gastrointestinal tract. Because it is administered via a central vein, osmolarity is not a problem. Hypertonic solutions are rapidly diluted by the large volume of blood.

I. Indications for use

- 1) NPO greater than 7 days (clinical indicators should be as significant in choosing TPN as just the number of days NPO).
- 2) Severe malnutrition.
- 3) Moderate to severely elevated metabolic rate.
- 4) Inability to access or non-functioning gastrointestinal tract.
- 5) Certain diseases; i.e., severe ulcerative colitis, Crohn's, malabsorption syndromes.
- 6) Limited access to peripheral veins.

II. Complications

- 1) Fluid and electrolyte imbalance.
- 2) Trace mineral deficiencies.
- 3) Complications associated with catheter placement; i.e., pneumothorax, air embolism, catheter embolism, arterial puncture, subclavian vein thrombosis.
- 4) Increased risk for infections and sepsis, related to central lines and/or disuse of the gut.
- 5) Essential fatty acid deficiency (only if lipid emulsion not provided).
- 6) Hyperlipidemia
- 7) Hyperglycemia, hypoglycemia
- 8) Fatty liver
- 9) Cholestasis
- 10) Serum mineral and electrolyte imbalances.

III. Composition

Dextrose is provided as a calorie source, which provides 3.4 kcal/gram. Dextrose concentrations can be higher in TPN solutions than PPN solutions because they are administered through a central vein and diluted rapidly, causing less damage to the blood vessels. Dextrose concentrations should not exceed the liver's maximum rate of oxidation of glucose:

4 mg glucose/kg body weight/minute

Minimum requirement: 1 mg/kg body weight/minute

Maximum requirement: 5-7 mg/kg body weight/minute

Amino Acids are provided in the crystalline form. Amino acids are used for protein synthesis, not a source of calories. Amino acids provide 4 kcal/gram. Amino acid solutions vary in concentration (3.5-15%) as well as composition of individual amino acids.

A non-protein calorie to nitrogen ratio (NPC:N) is used as a guide in determining if adequate calories are being provided to "spare" the amino acids for anabolic protein functions.

NPC:N unstressed	150:1	1.0-1.5 gm/kg
NPC:N moderately stressed	100:1	1.5-2.0 gm/kg
NPC:N severely stressed (burns, sepsis)	80:1	2.0-2.5 gm/kg

Determining grams of protein per kg of ideal body weight (IBW) or adjusted weight for the obese patient is recommended.

Adjusted Weight = (Actual Weight - Ideal Weight) x .25 + Ideal Weight

Lipids provide a calorie source, as well as provide essential fatty acids. Lipids are available in 10% and 20% concentrations, which provide 1.1 kcal/ml and 2.0 kcal/ml respectively. Lipids should not exceed 30% of the total calories and no more than 20% of the total calories in septic patients, or 1-1.5 grams/kg body weight/day. To prevent essential fatty acid deficiency, 500 ml of a 10% fat emulsion or 250 ml of a 20% fat emulsion should be administered 2-3 times per week. 500 ml of a 20% fat emulsion can be administered once per week. In the septic patient, lipids should not exceed 1.0 gm/kg/24 hours as it predisposes them to clogging their reticuloendothelial system and this impairs immune function.

Lipids may be administered separately from the dextrose and amino acid solutions, or through 3:1 mixtures. Lipids are isotonic, therefore, they will not affect the osmolarity of the solution.

Lipids are composed of safflower oil, soybean oil, or a combination of the two, with the addition of glycerol and egg phospholipids. Lipids may be contraindicated in treating people with abnormal lipid metabolism, liver disease, or those with severe egg allergies.

Electrolytes promote tissue synthesis. Electrolytes must be added to TPN solutions and adjusted as per lab data indices.

Vitamin needs vary with disease state. Current parenteral vitamins supplements are based on the recommendations of the Nutrition Advisory Group of the American Medical Association. Requirements for vitamins can be altered by malnutrition, specific disease states, infection, trauma, severe stress, drug therapy, and the intravenous administration of protein, carbohydrate, and fat. Therefore, the RDA's for fat-soluble vitamins should be given, whereas 2-15 times the RDA for water-soluble vitamins should be given. Increased doses of fat-soluble vitamins can build up to toxic levels causing complications. Increased doses of water-soluble vitamins do not carry the risk of toxicity due to the body's ability to rapidly excrete these excesses. Vitamin K was previously not routinely included in the adult multiple vitamin preparations and could be given orally, intramuscularly, or intravenously, once weekly unless contraindicated due to anticoagulation therapy. Some vitamin/mineral sources now add vitamin K, so check product literature from the manufacturer.

Trace Elements are essential to support healing and to prevent clinical deficiencies. Multiple trace element preparations are available, as well as single entity products.

IV. Administration/Rate

During the first 24 hours, no more than 2 liters of solution should be administered to allow for the adjustment of endogenous insulin production and to avoid hypo and hyperglycemia reactions. Lipids are administered separately, unless a 3-in-1 mixture is available. A test dose of lipids can be administered to check for any adverse reactions, i.e. dyspnea, cyanosis, nausea, vomiting, headache, fever, chest or back pain, or an allergic reaction to the egg phospholipids. Test dose for lipids: 10% emulsion is infused at a rate of 1 ml/minute for 15-30 minutes. If no adverse reaction, increase to a rate of 80-100 ml/hour. 20% emulsion is infused at a rate of 0.5 ml/minute for 15-30 minutes. If no adverse reaction, increase to a rate of 60 ml/hour. After the first bottle of lipids is administered, check the serum triglyceride levels. If the triglyceride level is greater than 300 ml/dl, lipids should be administered the minimal dose of 1-2 times per week to provide essential fatty acids.

If the administration of the TPN formula is suddenly interrupted, a dextrose solution should be administered at the same rate as the TPN was provided. The dextrose solution will prevent hypoglycemia. When the TPN formula is restarted, no attempts should be made to increase the rate to meet the ordered daily volume. Continue to administer the formula at the same rate.

Both TPN and PPN solutions should be decreased gradually. The rate of the solutions should be tapered over a 2-hour period. Abrupt withdrawal of a hypertonic solution may result in hypoglycemia in those patients with diabetes stress, and sepsis. Decreasing the rate to 40 ml/hour for 2 hours before discontinuing will prevent sudden hypoglycemia.

V. Monitoring

- 1) Baseline obtain the following: complete chemical profile, prothrombin time, platelet count, triglycerides, CBC, and an urinalysis.
- 2) Daily weights for the critically ill, 3 times per week for all others.
- 3) Vital signs every shift, more frequently for those critically ill.
- 4) Record daily I & O's.
- 5) Weekly labs: Cholesterol, triglycerides, total protein, albumin, prealbumin, bilirubin, liver enzymes, prothrombin time, calcium.
- 6) Mg, PO4 levels two times per week.
- 7) Glucose, Na, K, Cl daily for 3 days, then 2-3 times per week.
- 8) BUN and creatinine 3 times per week.
- 9) Nitrogen balance 24-48 hours after the full rate is achieved, then weekly.
- 10) Glycosuria and ketones 6-8 times per day initially, then 2-4 times per day, or accuchecks every 4-6 hours as indicated.
- 11) Specific gravity or osmolarity.
- 12) Change dressings every 48-72 hours.
- 13) Change tubing every 24 hours.
- 14) Monitor catheter site for signs of infection.
- 15) Mouth care – maintain normal oral hygiene.
- 16) Record the formula, bag number, and time each new bag is hung.

REFERENCES:

1. Matarese, L., Gottschlich, M., *Contemporary Nutrition Support Practice – A Clinical Guide*, W. B. Saunders Co., Philadelphia, PA, 1998.
2. Gottschlich, M., *The Science and Practice of Nutrition Support – A Case-Based Core Curriculum*, American Society for Parenteral and Enteral Nutrition, Kendall/Hunt Publishing CO., Dubuque, Iowa, 2001.
3. American Society For Parenteral and Enteral Nutrition, Silver Springs, MD, 1999.

INCREASED CALORIE AND INCREASED PROTEIN DIET

PURPOSE

To provide a nutritionally adequate diet with calories in excess of the normal daily needs and protein in amounts of 1 to 1.5 grams per kilogram body weight. A diet with increased amounts of calories and protein is prescribed for persons who need nutritional rehabilitation because of irregular eating habits and poor selection of foods; for pathologic conditions such as fevers in which energy requirements are increased; for gastrointestinal disturbances where there is nausea, vomiting and diarrhea; when the metabolic rate is accelerated such as hyperthyroidism; for the treatment of persons with hepatitis and cirrhosis of the liver; and for replacement of tissue loss as in burns or following surgery.

NUTRITIONAL ADEQUACY

This diet meets and may exceed the Recommended Dietary Allowances when the types and amounts of food suggested are included every day. This increased calorie and protein diet is a normal diet with an increase of food to provide liberal levels of protein, minerals, vitamins, and calories.

DIET PRINCIPLES

If a person is maintaining weight at a constant level, an increase of 1000 calories to the daily caloric needs will result in a gain of about two pounds per week. For some persons a three-meal plan with nourishment between meals is best; for other persons, a decrease in the number of feedings per day may result in a better appetite and an increase in the total food eaten. A small addition to each meal or a bedtime feeding may answer the need.

SUGGESTIONS FOR ADDING PROTEIN TO THE DIET

1. Either skim milk powder or extra strength milk may be added to cooked foods, such as: hot cereal, scrambled eggs, soups, gravies, ground meat (for meat patties, meat balls, and meat loaf), casseroles, and cooked desserts; and may be used in baking.

Extra strength milk is made by mixing 2 tablespoons of dry powdered milk into every cup of milk you use

Note that institutional dry milk and dry milk products may not be rehydrated and used as a beverage. Sanitation laws and regulations limit use to cooking purposes.

2. Add diced or ground meat to soups and casseroles.
3. Add grated cheese or cheese sauce to vegetables, potatoes, scrambled eggs, sauces, soups, and casseroles. Add extra cheese to pizza.
4. Choose dessert recipes which contain eggs, such as: sponge cake, angel food cake, egg custard, or pudding.

SUGGESTIONS FOR ADDING CALORIES TO THE DIET

1. Mix butter or margarine into hot foods such as soups, vegetables, mashed potatoes, cooked cereals, and rice.
2. Use mayonnaise instead of salad dressing – almost twice the number of calories.
3. Use peanut butter (which has protein as well as calories). Spread it on fruit such as an apple, banana, or pear; or stuff celery with it. Add it to a sandwich with mayonnaise or cream cheese. Add peanut butter to pancakes and waffles before pouring on the syrup. Blend peanut butter into

milk shakes.

4. Spread honey or jam on toast; use honey as a sweetener in coffee or tea; and add it to cereal in the morning.
5. Spread bagels with cream cheese or peanut butter.
6. Sour cream or yogurt can be used on vegetables such as potatoes, beans, carrots, and squash. Use them in gravies or as salad dressing for fruit.
7. Heavy cream can be used in hot cereals, hot chocolate, or other beverages. It can also be added to pies, fruits, puddings, and other desserts.
8. Use milk or heavy cream instead of water to make soups, hot cereals, and hot chocolate.
9. Add powdered coffee creamers to gravies, soups, milk shakes, and hot cereal.
10. Have ready-to-eat snacks such as nuts, dried fruits, candy, granola, crackers and cheese easily available. Ice cream, milk shakes, and popsicles are also good snacks to have on hand.
11. Add raisins, dates, or chopped nuts and brown sugar to hot cereals or to cold cereals for a snack.
12. Pour gravies and cream sauces on your meats and vegetables.
13. Use fruits canned in heavy syrup.
14. Fry foods vs. baking or broiling.

HIGH CALORIE – HIGH PROTEIN SUGGESTIONS

Chocolate Milk Shake – Blend the following:

Whole milk, 8 ounces
Vanilla ice cream, 1/2 cup
Chocolate syrup, 1 1/2 ounces

Approximate:	Calories	415
	Carbohydrate	60 grams
	Protein	10 grams
	Fat	18 grams

Chocolate Malted Milk – Blend the following:

Whole milk, 8 ounces
Vanilla ice cream, 1/2 cup
Chocolate syrup, 1 1/2 ounces
Malted milk, 2 tablespoons

Approximate:	Calories	500
	Carbohydrate	70 grams
	Protein	10 grams
	Fat	20 grams

SAMPLE MEAL PLAN

BREAKFAST

Oatmeal, 3/4 cup, Made with
Whole Milk, 1/2 cup
Margarine, 1 tsp.
Honey, 1 Tbsp.
Bagel, 1/2 medium
Peanut Butter, 1 Tbsp.
Orange Juice, 3/4 cup
Whole Milk, 1 cup

LUNCH OR SUPPER

Vegetable Soup, 1 cup, Add
2 oz. Ground Meat
Crackers, 4
Margarine, 1 tsp. per cracker
Fruit Cocktail (Heavy
Syrup), 1/2 cup
Whole Milk, 1 cup

DINNER

Chicken Breast, 3 1/2 ounces
Baked Potato, 1 medium,
Top with:
Sour Cream, 2 Tbsp.
Margarine, 1 Tbsp.
Broccoli, 1/2 cup, with
Cheese Sauce, 1 oz.
Peaches, (sliced) (Heavy
Syrup), 1/2 cup
Whole Milk, 1 cup
Ice Cream, 1/2 cup

SNACK

Whole Milk, 1 cup
Cookies, 3

The plan can be individualized to meet nutritional needs.

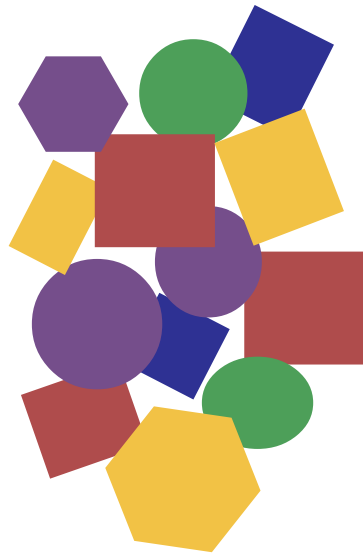
The diet as listed in the Sample Meal Plan contains approximately:

Calories	2662		
Protein	113 grams (17%)	Sodium	2946 milligrams
Carbohydrate	276 grams (41%)	Potassium	4542 milligrams
Total Fat	126 grams (43%)	Iron	11 milligrams
Cholesterol	362 milligrams		
Dietary Fiber	14 grams		

RESOURCES:

1. Eating Hints, Recipes and Tips for Better Nutrition During Cancer Treatment, U. S. Department of Health and Human Services, Public Health Service, NIH Publication No. 86-2079, Aug. 86.
2. Nutrition and HIV Your Choices Make a Difference, Peggy A. Wickevire, M. S., R. D., Tennessee Dept. of Health and Environment.

Last updated in 1996 edition.



Nutrition For Special Needs

NUTRITION IN HIV/AIDS

Good nutrition is imperative for persons with human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS).

PURPOSE

The purpose of good nutrition is to:

1. Maintain or achieve adequate nutritional status. Malnutrition and its complications in the HIV infected person make him/her susceptible to opportunistic infections and decrease the effectiveness of and tolerance to medicines and therapies.
2. Minimize nitrogenous losses during acute illness.
3. Improve clinical and psychosocial well-being.
4. Prevent food-borne illness.

NUTRITIONAL ADEQUACY

The diet is nutritionally adequate when the types and amount of foods suggested for the normal diet are included every day. See USDA Food Guide Pyramid for recommended serving sizes for various age groups. Alterations in the diet and means of nutrition support may be needed due to changes in symptoms and disease state. These diets can be found in other sections of this manual:

- Mechanical diet
- Modified fat diet
- High calorie, high protein diet
- Enteral/parenteral nutrition
- Diet for hypertriglyceridemia
- Dysphagia diet
- Low-fiber/low residue diet
- Restricted lactose diet

DIET PRINCIPLES

Adequate nutrition is important in the treatment of HIV and AIDS. The goals of nutrition therapy are:

1. Prevent development of malnutrition and related immune suppression.
2. Early assessment and treatment of nutrient deficiencies.
3. Preserve lean body mass.
4. Provide adequate amounts of all nutrients.
5. Minimize symptoms of gastrointestinal malabsorption.
6. Minimize drug-nutrient interactions.
7. Support activities of daily living and quality of life.
8. Prolong survival.

NUTRITIONAL ASSESSMENT

1. Anthropometrics:

Weight:

- a. Assess weight change.
 - i. Weight loss may precede the diagnosis of HIV.
 - ii. Asymptomatic patients may be unable to maintain body energy stores.
- b. Assess actual weight vs. pre-illness weight vs. ideal body weight and weight change.
- c. Assess body mass index (BMI).

See Weight Management Section of the Missouri Diet Manual for more information on BMI.

2. Energy:

Currently there are no studies available to estimate caloric needs of those with HIV/AIDS. The Harris-Benedict Equation is recommended to determine basal energy expenditures (BEE). Use actual body weight in calculating BEE. Acute systemic infection may increase the metabolic rate by 20 - 60%. An additional 500 - 1000 calories may be added for weight gain in stable patients. To prevent fatty liver infiltration, no more than 45 kcal/kg should be provided.

3. Protein:

1.0 - 1.4 g/kg actual body weight = maintenance.

1.5 - 2.0 g/kg actual body weight = repletion of protein stores.

Strive for a non-protein calorie to nitrogen ratio of 150 - 125:1 to promote anabolism.

Adjust for renal or hepatic disease, as well as infection and/or malabsorption. When evaluating visceral protein stores, do not use total lymphocyte count and energy skin testing. These are unreliable indicators of nutritional status due to the impaired immune function of those with HIV/AIDS.

4. Fat:

Tolerance to fat varies. When malabsorption manifested by diarrhea occurs, choose a low fat diet. MCT oil may be used as a supplement.

5. Vitamins/Minerals:

Vitamins and mineral requirements are based on body losses from diarrhea, emesis, and drainage. There is an increased need for the following vitamins and minerals: vitamins A, B complex, C, and folate, zinc, copper, and iron. A vitamin mineral supplement such as a prenatal vitamin, is recommended to meet 100% of the HIV/AIDS patient's vitamin and mineral needs.

Mega-doses of vitamins and minerals must be avoided. Excess of many vitamins and minerals has been shown to be immunosuppressive. Excessive zinc supplementation suppresses immune function.

Nutritional anemias are common in the HIV/AIDS patient. Assess for iron and vitamin B₁₂ deficiencies. Malabsorption of vitamin B₁₂ is common in the HIV/AIDS patient. Therefore, a Schilling test is recommended to assess vitamin B₁₂ absorption.

6. Nutrition History:

A complete nutrition history should include the following:

- a. Living conditions
- b. Food purchasing abilities
- c. Meal planning and preparation
- d. Sanitation practices in food preparation
- e. Usual meal habits
- f. Snacks
- g. Where meals are eaten
- h. Food preferences
- i. Allergies, intolerances, and aversions related to symptoms
- j. Previous dietary restrictions
- k. Vitamin/mineral supplements
- l. Herbal supplements, other complementary therapies
- m. Taste changes, food aversions
- n. Use of non-prescription drugs
- o. Bowel habits
- p. Activity level
- q. Cognitive level

7. Medical History:

- a. Presence of opportunistic infection
- b. Gastrointestinal problems, such as diarrhea, abdominal pain, and/or vomiting
- c. Concurrent medical problems
- d. Psychiatric illness history
- e. Substance abuse/addictions

8. Physical Assessment – evaluate and assess:

- a. Weight for height
- b. Weight change
- c. Evidence of wasting such as loss of muscle mass
- d. Oral cavity for mouth lesions, inflammation/pain
- e. Swallowing ability
- f. Edema
- g. Fevers
- h. Feeding ability
- i. Skin turgor
- j. Condition of fingernails - thickness/ridges/spoon shaped

9. Laboratory review – evaluate and monitor labs.

- a. Albumin, pre-albumin, cholesterol, triglycerides, blood sugar
- b. Evaluation of anemias
- c. Level of immune suppression; T4 counts, neutropenia
- d. Electrolytes

10. Drug profile:

- a. Review for potential drug-nutrient interactions
(See Food/Drug Interaction chart at the end of this section.)

NUTRITION INTERVENTION

Upon completion of the nutritional assessment, provide an individualized nutrition care plan which includes goals, requirements, and an action plan to achieve the expected outcomes.

Nutrition counseling should be provided during the early asymptomatic period and revised and updated as needed. The following topics should be addressed:

- a. The importance of a well-balanced diet.
- b. A healthful eating plan.
- c. Managing side effects, (i.e. diarrhea, nausea and vomiting, difficulty chewing and swallowing).
- d. Food safety issues.
- e. Guidelines for evaluating efficacy of nutrition products.
- f. Discussion of alternative feeding methods, (i.e. enteral and parenteral nutrition).
- g. Medical nutritional supplements - use, cost, purchase, goals and insurance reimbursement.
- h. Use of vitamin/mineral supplements.
- i. Drug-nutrient interactions.

SIDE EFFECTS, PROBLEMS, POSSIBLE SOLUTIONS

1. Decreased oral intake related to pain, fever, depression, drug therapies, fatigue, or dementia:
 - Eat small, frequent meals at 3-4 hour intervals.
 - Drink fluids between meals.
 - Eat high-calorie, high-protein foods.
 - Serve foods attractively.
 - Provide relief from pain.
 - Consider appetite stimulants.
 - Take multivitamin/mineral supplement.
2. Nausea and Vomiting:
 - Eat small, frequent meals.
 - Replace fluids and electrolytes.
 - Eat bland, salty, or dry foods.
 - Avoid high fat or overly sweet foods.
 - Drink fluids between meals.
 - Withhold favorite foods and beverages to avoid future food aversions.
 - Avoid hot foods; use cold food items, especially high-protein non-meat items.
 - Adjust medication administration times.
 - Avoid lying down or heavy activity after meals.
 - Use anti-emetic medication.
3. Difficulty Chewing and Swallowing:
 - Serve soft, moist, or pureed foods.
 - Avoid acidic, spicy, or irritating foods.
 - Serve foods at room temperature or colder.
 - Dunk toast, cookies, crackers, etc., in milk or soup to soften.
 - Drink liquids and semi-solid foods through a straw.
 - Use melted butter, margarine, gravy, broth, sauces, or syrup to moisten foods.
 - Use high calorie, high-protein supplements.
 - Practice good oral hygiene.

4. Lethargy and Dementia:

- Assess feeding needs of the patient.
- Educate the caregiver of feeding techniques and adequate nutrition.
- Accept friends and relatives offers to help prepare foods.
- Consider home delivered meals.
- Consider use of frozen meals and entrees.
- Freeze leftovers and extra portions for later use.

5. Diarrhea possibly caused by antibiotics, emotional stress, contaminated or hypertonic enteral formulas, mega-doses of vitamins, self prescribed home remedies, infectious agents, or hypoalbuminemia:

- Maintain adequate fluid intake.
- Modify diet; i.e. low residue, low fat, low lactose or lactose free, caffeine-free.
- Provide small, frequent meals.
- Use pectin-containing bulk agent if no enteric pathogen is identified and diarrhea is not profuse.
- Consider antidiarrheal medications.
- Consider 1-2 cups yogurt with active lactobacillus cultures. Do not take at the time of antibiotic administration.
- Consider an elemental diet and MCT oil, which may enhance absorption.

6. Hypertriglyceridemia, hyperlipidemia possibly caused by infection, medication interaction, normal immune scavenger function:

- Antihyperlipidemic agent may be recommended.

ENTERAL/PARENTERAL THERAPY

Enteral and parenteral nutrition is to be used once all oral options have been exhausted. The purpose of nutrition support is to improve the quality of life and overall health of those suffering from HIV/AIDS.

Use the gut if it works. Most gastrointestinal related infections are contracted by bacterial/viral translocation secondary to gut atrophy, which can be seen in 2-3 days.

Enteral nutrition promotes the repletion of lean body mass, improves mental status, and may shorten the length of hospital stay.

When selecting a formula, consider the following: patient's current medical status, gastrointestinal function, tolerance and ability to consume food, product availability, and cost. PEG placement is advised if the tube feeding will be necessary for greater than 3 weeks. The formula chosen should be moderate in fat, high in branched chain amino acids, lactose-free, high fiber, supplemented with glutamine, and provide 100% of the RDA/Dietary Reference Intakes (DRI) for vitamins and minerals.

Parenteral nutrition is used in approximately 2 - 3% of all AIDS patients. It is only used when oral or enteral therapies fail or when malabsorption or bowel dysfunction warrant its use.

Additional information on enteral and parenteral nutrition can be found in the Nutrition Support section of the Missouri Diet Manual.

POTENTIAL FOOD/DRUG INTERACTION OF HIV MEDICATIONS

MEDICATION	TYPE	FOOD/MEAL RECOMMENDATION	OTHER POTENTIAL CONCERNS
Abacavir (Ziagen)	*NRTI	Take without regard to food.	Nausea, vomiting, hypertriglyceridemia.
Stavudine (d4T, Zerit)	*NRTI	Take without regard to food.	Nausea, vomiting, diarrhea, high SGOT, high SGPT.
Zalcitabine (ddc, Hivid)	*NRTI	Take on empty stomach.	Anorexia, low weight, nausea, vomiting, pharyngitis, anemia.
Zidovudine (AZT, 2DV, Retrovir)	*NRTI	High fat meal may lower drug absorption. Take with low fat meal.	Anorexia, nausea, vomiting, severe anemia.
Didanosine (ddl, Videx)	*NRTI	Take at least ½ hour before or 2 hours after food.	Anorexia, low weight, dry mouth, nausea, vomiting, diarrhea, low taste acuity, constipation, stomatitis, pain anemia, high SGOT, high SGPT, high TG.
Lamivudine (3 TC, Epivir)	*NRTI	Take without regard to food.	Nausea, vomiting, anemia.
Delavirdine Mesylate (Rescriptor)	**NNRTI	Take without regard to food.	Anemia.
Nevirapine (NVP, Viramune)	**NNRTI	Take without regard to food.	Nausea, vomiting.
Efavirenz (Sustiva)	**NNRTI	Take HS without regard to food, but not with a high fat meal.	Hypertriglyceridemia, hypercholesterolemia.
Indinavir Sulfate (IDV, Crixivan)	***PI	Take 1 hour before or 2 hours after a meal. May take with a small low fat meal. Adequate hydration essential to prevent kidney stones. Drink at least 1500 ml fluids per day.	Nausea, abdominal pain.
Nelfinavir Sulfate (NFV, Viracept)	***PI	Take with meals.	Flatulence, diarrhea.
Ritonavir (RTV, Norvir)	***PI	Take with food. May need to mask taste.	Nausea, vomiting diarrhea, hypertriglyceridemia, hypercholesterolemia, high SGOT, high SGPT.
Saquinavir (SQV, Invirase, Fortovase)	***PI	Must take within 2 hours of a high calorie, high fat meal. Drug levels are too low if taken without food.	

*NRTI - Nucleoside reverse transcriptase inhibitor

**NNRTI - Nonnucleoside reverse transcriptase inhibitor

***PI - Protease Inhibitor

REFERENCES:

1. American Dietetic Association, *A Guide to Nutrition in HIV and AIDs*, 1997.
2. American Dietetic Association, *Manual of Clinical Dietetics*, 6th Edition, 2000.
3. Chiebowski, RT, Grosvenor M, Lillington L, et al. Dietary intake and counseling, weight maintenance and the course of HIV infection. J. Am. Diet Assoc. 1995; 95: 428- 435.
4. Food and Nutrition Board. Recommended Dietary Allowances, 10th Edition, Washington, D.C.: National Academy of Sciences; 1989. 50.
5. Fosmire, G.J. Zinc Toxicity. American Journal of Clinical Nutrition. 1990; 51:225-27.
6. Gordon, Anna, *Aids Nutritional Aspects of the AIDS Patient*. Norwich Eaton Audio-Visual Library, NY, NY.
7. Mahan, L.K., Arlen, M., Food, Nutrition and Diet Therapy, F.A. Davis Company, Philadelphia, PA. 2001.
8. Missouri Department of Health, *Missouri Diet Manual*, 8th Edition, 1996.
9. Murray, M.J., and Murray, A.B., Murray, M.B., and Murray, C.J. The adverse effect of iron repletion on the course of certain infections. British Medical Journal 1978; 2:1113-15.
10. Position of the American Dietetic Association and Dieticians of Canada: Nutrition intervention in the care of persons with HIV infections. Journal of the American Dietetic Association. 2000; 100: 708-717.
11. Pronskey M, Fields- Gardner C, *HIV Medication Interaction Book*, 2nd Edition, Birchrunville, PA 2001.
12. Ross Laboratories, *Nutrition Guidelines for People With HIV Infection*, Columbus, OH 1993.
13. Ross Products Division, *Nutrition and HIV Practical Dietary Guidelines for People with HIV Infections or AIDS*, January 1996.
14. Wickware, Peggy, *Nutrition and HIV: Your Choices Make A Difference*, Tennessee Department of Health and Environment.

TYRAMINE RESTRICTED DIET

PURPOSE

To prevent a reaction (hypertensive crisis) that can occur when persons receiving monoamine oxidase (MAO-) inhibitor drugs eat foods containing tyramine.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of food suggested are included every day. Foods high in tyramine should be avoided. Foods containing greater than 5 mg. of tyramine may cause an increase in blood pressure. Those containing 25 mg. or greater may induce a hypertensive crisis. Foods with a moderate to low tyramine content should be used with caution in limited amounts that do not exceed 5 mg. of tyramine per day.

DIET PRINCIPLES

Tyramine is a breakdown product of the amino acid tyrosine. It can cause a pressor effect in patients who are receiving MAO-inhibitor drugs by releasing epinephrine and norepinephrine from sympathetic nerve endings and adrenal glands. Ingested tyramine is normally inactivated by the gastrointestinal tract and liver, but the drugs block this process. Symptoms can include a marked rise in blood pressure, headache and fever. The patient should continue the diet during the entire time the drug is being used and for at least 4 weeks after the drug is discontinued.

Some MAO-Inhibitors include:

<u>BRAND NAME</u>	<u>GENERIC NAME</u>	<u>CLASSIFICATION</u>
Nardil (Warner-Lambert)	Phenelzine Sulfate	Antidepressant
Eutonyl (Abbott)	Pargyline Hydrochloride	Antihypertensive Agent
Furozone (Eaton)	Furazolidone	Antimicrobial Agent
Marplan (Roche)	Isocarboxrazid	Antidepressant
Parnate (Smith, Kline and French)	Tuanylcypromine Sulfate	Antidepressant
Matulane (Roche)	Procarbazine	Antineoplastic Agent
Eldepryl (Summerset)	Selegaline Hydrochloride	Antiparkinson Agent

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>MODERATE – LOW TYRAMINE CONTENT</u> = 5 mg. or less (Limit use to one item per day in the recommended portion. Limit serving size to 1/2 cup or 4 ounces)	<u>NOT RECOMMENDED</u>
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts (2-3 servings)	Meat, fish, poultry, eggs, dried beans, dried peas, or peanut butter. Prepared any way. Vacuum packed fish or meat if eaten promptly or refrigerated only briefly. Liver if fresh. Nuts.	Caviar, paté (1 ounce). Peanuts.	Aged, dried, fermented, salted, smoked, and pickled meats and fish, including processed meats (bacon, sausage, liverwurst, hot dogs) and luncheon meats (corned beef, pepperoni, salami, bologna, ham). Liver. Fermented soybean products (Miso, some tofu products) meat extracts.
Milk, Yogurt, and Cheese (2-3 servings)	Whole, 2%, or skim milk. Dry milk may be used in cooking. Cottage cheese, cream cheese, Farmers cheese, processed cheese, ricotta cheese, cream soup.	Cultured dairy products including buttermilk, yogurt, sour cream. Chocolate milk, chocolate ice cream, chocolate pudding.	Aged cheese: Blue, boursault, brick, Brie, camembert, cheddar, colby, emmentaler, gouda, mozzarella, parmesan, provolone, romano, roquefort, stilton, monterey jack.
Bread, Cereal, Rice, and Pasta (6-11 servings)	All kinds. Whole grain or enriched, includes macaroni, noodles, spaghetti, rice.	Sourdough and fresh, homemade yeast-leavened breads. (May contain high levels of histidine.)	Breads or crackers containing cheese. Brewers yeast. Yeast extracts.
Fruits (2-4 servings)	Includes all fruits and fruit juices.	Raspberries, bananas, canned figs, raisins, red plums.	Overripe and spoiled fruits, banana peel.
Vegetables (3-5 servings)	Includes potatoes and all other vegetables and vegetable juices.	Avocado.	Sauerkraut; broad beans with pods such as fava beans, Italian green beans, snow peas. Potatoes and vegetables prepared with cheese and other foods not allowed.
Fats and Oils (Use sparingly)	All kinds. Butter, margarine, vegetable oil, salad dressing.		Salad dressings containing cheese.
Other (Moderate amounts not to exceed caloric requirements)	Dessert items such as cake, cobbler, cookies, custards, gelatin desserts, ice cream, pies, pudding, sherbet, and snack items such as potato chips.	Chocolate cake, pie and cookies.	Desserts containing cheese or other foods not allowed.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>MODERATE – LOW TYRAMINE CONTENT</u>	<u>NOT RECOMMENDED</u>
Beverages and Fluids (As desired)	Carbonated beverages, fruitades.	= 5 mg. or less (Limit use to one item per day in the recommended portion. Limit serving size to 1/2 cup or 4 ounces)	Some alcoholic beverages including chianti, burgundy, sherry, vermouth, beer, ale.
		White wine, port wine, distilled spirits – with physician approval. NOTE: Alcoholic beverages are not necessarily high in tyramine but may be high in other amines such as dopamine or histidine and may provoke an adverse reaction.	
		Caffeine in coffee, tea, and soft drinks (limit to 2-8 ounce servings/day). Caffeine does not contain tyramine, but may aggravate symptoms of headache and hypertension in some patients.	
Miscellaneous (As desired)	Condiments: ketchup, mustard, coconut, garlic, mint, nuts, olives, parsley, pickles, sauces, vinegar, spices, candy, honey, jam, jelly, marmalade, molasses, preserves, syrup, sugar.	1/4 cup soy sauce or teriyaki sauce, chocolate candy, peanuts.	Yeast extracts such as the British product Marmite; meat extracts such as soup base, commercial gravies, shrimp paste, liquid and powdered protein dietary supplements.

SAMPLE MEAL PLAN

BREAKFAST

Rice Krispies, 3/4 cup
 Toast, 1 slice
 Orange Juice, 3/4 cup
 2% Milk, 1 cup
 Margarine, 1 tsp.
 *Decaf Coffee or Tea
 Sugar, Jelly

LUNCH OR SUPPER

Vegetable soup, 1 cup
 Roast Beef Sandwich,
 Roast Beef, 2 oz.
 White Bread, 2 slices
 Mayonnaise, 1 tsp.
 Tossed Salad, 1 cup
 Italian Dressing, 1 Tbsp.
 Apple, 1 medium
 *Decaf Coffee or Tea

DINNER

Chicken Breast, 3.5 oz.
 Baked Potato, 1 medium
 Broccoli, 1/2 cup
 Peaches, (sliced) 1/2 cup
 Dinner Roll, 1 medium
 2% Milk, 1 cup
 Ice Cream (no chocolate), 1/2 cup
 *Decaf Coffee or Tea

SNACK

2% Milk, 1/2 cup
 Vanilla Wafers, 4

*Limit caffeine containing beverages to 2 - 8 ounce servings per day.

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately: (% - Percent of Total Calories)

Calories	2165	Cholesterol	230 milligrams
Protein	98 grams (18%)	Dietary Fiber	21 grams
Carbohydrate	318 grams (58%)	Sodium	2709 milligrams
Total Fat	62 grams (26%)	Potassium	4514 milligrams
		Iron	15 milligrams

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, L. K., Arlen, M. Krause's Food, *Nutrition and Diet Therapy*, 8th Edition, W. B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.
3. Nelson, J., Mayo Clinic Diet Manual, *A Handbook of Nutrition Practices* 7th Edition, Mosby YearBook, Inc., St. Louis, MO, 1994.
4. Skidmore-Roth, L., Mosby's Nursing Drug Reference, Mosby YearBook Inc., St. Louis, MO, 1994.

MILD PURINE RESTRICTED DIET

PURPOSE

To provide a diet which avoids high intakes of purines to prevent elevated serum uric acid levels and help prevent gout and urate kidney stones.

NUTRITIONAL ADEQUACY

This diet meets the Recommended Dietary Allowances when the types and amounts of food suggested are included every day. The recommended amount of iron will not be met for certain age groups unless iron-rich foods are served frequently.

DIET PRINCIPLES

Drug therapy has largely replaced the less effective purine restricted diet in the medical management of gout. Allopurinol both decreases the absorption of purines and decreases the synthesis of uric acid. Purines can be derived from synthesis in the body and from the breakdown of tissue nucleic acids as well as from the diet. Since diet is only one source of purines, diets severely restricted in purines will only lower serum urate by about 1 mg/dl. However, a high purine diet can raise serum urate levels and should be avoided by individuals at risk for high blood uric acid levels. It may not be necessary to restrict overall dietary protein since protein has been shown to increase urinary excretion of urate.

An association has been demonstrated between the abuse of alcoholic beverages (especially beer) and gout. Alcohol intoxication may result in decreased uric acid excretion as well as increasing nucleic acid breakdown. Beer is the only acknowledged alcoholic beverage with measurable purine content. Though the total purine content of beer is not particularly high, it contains the purine guanosine which is very readily absorbed. However, moderate alcohol consumption of less than 100 mg/day taken with food results in only minor changes in uric acid metabolism.

Obesity is another associated factor. Gradual weight loss is beneficial in lowering serum and urinary concentrations of urate. Rapid weight loss or high fat diets which result in ketosis can impair urate excretion and precipitate attacks of gout.

Patients taking uricosuric drugs such as probenecid should avoid high purine foods and drink ample amounts of fluid to help prevent urate kidney stones.

The most important aspects of dietary management of patients with elevated serum uric acid levels are:

1. Avoid foods high in purines (containing 100 – 150 mg/100 gm).
2. Encourage fluids to a minimum of 2 – 3 quarts/day.
3. Adjust calories for gradual weight reduction in obese patients.
4. Avoid excessive alcohol intakes, especially beer. Alcohol should be taken with meals or diluted.
5. Avoid high fat, low carbohydrate (ketogenic) diets.
6. Protein intake should not exceed 0.75 – 1.0 gm/kg of Ideal Body Weight for healthy adults; meat consumption should not exceed 3 to 4 ounces at a meal.
7. Avoid large, heavy meals late in the evening. Large meals are stress factors for uric acid stone formation.

8. Liberal carbohydrate intake (at least 100 gm/day) to prevent tissue catabolism and ketosis.

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	*MODERATE PURINE CONTENT <u>9-100 mg Purine/100 g</u>	HIGH PURINE CONTENT <u>100-1000 mg Purine/100 g</u>
Meat, Poultry, Fish, Dry Beans, Eggs and Nuts (2-3 servings)	Eggs, cheese, peanut butter, nuts.	Fish, eel, beef, lamb, veal, pork, poultry, shellfish, dried beans and peas.	Anchovies, brains, goose, heart, herring, kidney, liver, mackerel, meat extracts, mussels, partridge, roe, sardines, scallops, sweetbreads.
Milk, Yogurt, and Cheese (2-3 servings)	2%, Skim milk, buttermilk or evaporated milk. May be used as beverage or in cooking. Yogurt, cheese, cheese products, cream soup.		
Bread, Cereal, Rice, and Pasta (6-11 servings)	Bread, cereal, macaroni, noodles, spaghetti, rice.	Whole-grain breads and cereals, oatmeal, wheat germ, wheat bran.	
Fruits (2-4 servings)	Includes all fruits.		
Vegetables (3-5 servings)	Includes potatoes and all other vegetables.	Asparagus, lentils, mushrooms, spinach, green peas, cauliflower.	
Fats and Oils (In moderation)	Butter, margarine, cream, mayonnaise, vegetable shortenings, vegetable oils.	Meat gravies.	
Other (Moderate amounts not to exceed caloric requirements)	Dessert items such as custards, fruit whips, gelatin desserts, ice cream, ices, puddings, sherbet, cake, cookies.		Mincemeat.
Beverages and Fluids (As desired, minimum of 2 – 3 qts. per day)	Coffee, decaffeinated coffee, cereal beverages, tea, cocoa, carbonated beverages, fruit drinks.	Soups made with meat stock, broth, alcohol in moderation with permission of physician.	

<u>FOOD GROUPS</u>	<u>RECOMMENDED</u>	<u>*MODERATE PURINE CONTENT 9-100 mg Purine/100 g</u>	<u>HIGH PURINE CONTENT 100-1000 mg Purine/100 g</u>
Miscellaneous (As desired)	Condiments (all kinds) ketchup, coconut, garlic, mint, mustard, olives, parsley, pickles, spices (all kinds), vinegar, cream sauces.		Baker's yeast and Brewer's yeast when used as a supplement.

*Moderate – one serving (2 to 3 oz.) of meat, fish, or fowl or one serving (1/2 cup) of vegetable from this group is allowed each day or five days per week (depending on condition) during remissions.

SAMPLE MEAL PLAN

BREAKFAST	LUNCH OR SUPPER	DINNER
Egg, 1 Rice Krispies, 3/4 cup White Toast, 1 slice Orange Juice, 3/4 cup 2% Milk, 1 cup Margarine, 1 tsp. Coffee or Tea Sugar, Jelly	Tomato Soup, 1 cup Roast Beef Sandwich, Roast Beef, 2 oz. White Bread, 2 slices Reduced Fat Mayonnaise, 1 Tbsp. Apple, 1 medium Coffee or Tea	Chicken Breast, 3.5 oz. Baked Potato, 1 medium Broccoli, 1/2 cup Peaches, (sliced) 1/2 cup Dinner Roll, 1 medium Angle food Cake, 1/12 slice 2% Milk, 1 cup Margarine, 1 tsp. Coffee or Tea

SNACK

2% Milk, 1/2 cup
Vanilla Wafers, 4

The plan can be individualized to meet nutritional needs.

The diet as listed in the Sample Meal Plan contains approximately:

Calories	2112	Dietary Fiber	16 grams
Protein	107 grams (18%)	Sodium	2699 milligrams
Carbohydrate	304 grams (58%)	Potassium	4304 milligrams
Total Fat	54 grams (26%)	Iron	16 milligrams
Cholesterol	488 milligrams		

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, L. K., Arlen, M. Krause's Food, *Nutrition and Diet Therapy*, 8th Edition, W. B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.

TEST DIETS

Test diets vary from hospital to hospital and physician to physician. The test diets listed in this diet manual are for general information only and the attending physician should give approval for their use.

BARIUM ENEMA TEST DIET

Use prior to examination of the colon.

Provide a high volume (3000 cc per day) clear liquid diet for 1 to 6 meals prior to the examination.

MEAT-FREE TEST DIET

Use for diagnosis of occult blood in the feces.

For 3 – 7 days prior to the test, observe the following guidelines:

- Avoid all meat, fish, and poultry.
- Increase fiber.
- Avoid horseradish, beets, vitamin supplements, aspirin containing compounds, bananas, tomatoes, iron, and ascorbic acid supplements.

GLUCOSE TOLERANCE TEST

Use for diagnosis of diabetes mellitus and other glucose metabolism disorders.

Studies indicate that as long as a patient is on a normal diet which contains at least 150 gm carbohydrate daily, patient adherence to a 300 gm carbohydrate test diet for three days prior to the glucose intolerance test is unnecessary except in the individual who has been on an inadequate, hypocaloric diet.

This test requires a fasting period prior to the actual glucose tolerance test.

HIGH FAT TEST DIET

Use as test for fat malabsorption.

Fat intake must be estimated. Include at least the following foods or their nutritive equivalents daily for 3 days.

<u>Food</u>	<u>Fat (gm)</u>
2 cups whole milk	20
8 oz. lean meat or 5 oz. medium-fat meat (May substitute 5 oz. high-fat meat and reduce fats to 7 tsp.)	24-25
1 egg	5
3-5 servings vegetables	trace
2-4 servings fruits	trace
6-11 servings whole-grain or enriched breads and cereals	trace
10 fat choices (1 choice = 1 tsp.) such as butter, margarine, oils, etc...	50
Total fat	99-100 gm

VANILLYLMANDELIC ACID TEST (VMA) Use for diagnosis of pheochromocytoma.
(As a confirmation of elevated catecholamine excretion or unexplained hypertension).

Dietary restrictions are not indicated for the VMA test, as long as the patient has been maintained on a normal diet prior to and during the period of urine collections. Fasting may increase VMA level.

5 – HYDROXYINDOLEACETIC ACID (5 – HIAA) AND SEROTONIN-RESTRICTED DIET Use for diagnosis of malignant carcinoid tumors.

Foods containing 5 – HIAA and its precursor serotonin are eliminated 24 hours prior to and during the test. Eliminate the following foods: bananas, plantains, tomatoes, plums, avocados, pineapples, pineapple juice, walnuts, passion fruit, eggplant, butternuts, hickory nuts, kiwi fruit, and pecans.

REFERENCES:

1. American Dietetic Association, *Manual of Clinical Dietetics*, 4th Edition, 1992.
2. Mahan, L. K., Arlen, M. Krause's Food, *Nutrition and Diet Therapy*, 8th Edition, W. B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.

DIET for PKU

PURPOSE

For individuals with Phenylketonuria (PKU), the purpose of the diet is to lower the blood phenylalanine levels to between 2 mg/dL to 6 mg/dL and to supplement tyrosine which has become conditionally essential. This will promote normal mental development in children and improve mental functioning in adults.

NUTRITIONAL ADEQUACY

If the diet is properly prescribed and consumed, it will meet the National Research Council's Recommended Dietary Allowances.

PHYSIOLOGY

Patients with PKU have deficient activity of phenylalanine hydroxylase, the enzyme that converts phenylalanine to tyrosine. In patients with PKU, the phenylalanine in the blood begins to rise shortly after birth. The elevation of phenylalanine or its metabolites in the blood is toxic to the brain. The clinical features of untreated PKU are often not apparent until the baby is 6 to 12 months of age and include microcephaly, seizures, rashes, pigment dilution, an unusual body odor and hypotonia.⁷ Once the symptoms of the disease are apparent, the damage is irreversible, although further damage can be avoided by nutrition therapy. If PKU is left untreated, individuals develop severe to profound mental disabilities, behavioral disabilities and irreversible brain damage. There is no safe age when dietary restriction can be discontinued.

Women with PKU who have elevated blood phenylalanine at conception and during pregnancy have a high incidence of offspring with birth defects and psychomotor disabilities. Treatment should be initiated before conception and maternal phenylalanine levels maintained at < 4 mg/dL. The Maternal PKU Collaborative Study has developed a nutrition support protocol for treatment of pregnant women with PKU.⁵

DIET PRINCIPLES

Due to the complexity of the diet and the need for special foods, the dietary treatment should be administered in a metabolic center where there is an experienced physician, dietitian and biochemical facility. The growth and development of the child and the accumulation of metabolites must be routinely monitored. If a child or adult with PKU is admitted to a local hospital, the dietitian should contact the metabolic center dietitian for information. (Metabolic Centers in Missouri are listed in a following section.)

The principles of the PKU diet are:

1. The diet is modified in protein, energy, phenylalanine, and tyrosine.
2. Although all foods contain some phenylalanine, protein-rich foods (meats, poultry, fish, nuts, and dairy products) contain high amounts of phenylalanine and are restricted.
3. A medical formula is used to provide 75% to 90% of protein needs with little or no phenylalanine and adequate tyrosine (see Table 1). The total protein requirements are greater than the RDA since most medical formulas are L-amino acids which may not be utilized as well as natural protein.
4. Phenylalanine needs are based on estimated tolerance for ingested phenylalanine. In infants, regular infant formulas or breast milk can be added to the medical formula to provide the small amount of phenylalanine required for growth. In children and adults, low protein foods such as fruits, vegetables, breads, cereals, and pastas (both low protein and regular) are used in prescribed amounts to provide the required phenylalanine and the other 10% - 25% of protein needs.

5. Baseline energy requirements are calculated using standard prediction formulas and modified based on the growth response of the child.^{1,2} Energy needs are met by the medical formula and other special low protein foods such as low-protein breads and low-protein pastas. Adequate calories must be provided to avoid protein catabolism which can elevate phenylalanine levels.

A protocol for treatment of PKU and the phenylalanine exchange food lists are available.^{3,4} See Table 1 for composition of some medical formulas used in the treatment of PKU.

Table 1 Phenylalanine, Tyrosine, Protein and Calories of Medical Formulas Used in the Treatment of PKU					
Medical Formula	Age	PHE (mg) Per 100 gm of Product	Tyr (mg)	Pro (gm)	Calories
Lofenalac ^a	Infant	75	800	15	460
Phenyl-free 1 ^a	Infant/Toddler	0	1600	16.2	500
Phenyl-free 2 ^a	Child/Adult	0	2200	22	410
Phenyl-free 2 HP ^a	Child/Adult	0	4000	40	390
XPhe Analog ^b	Infant	0	1370	13	475
XP Maxamaid ^b	1-8 years	0	2560	25	350
XP Maxamum ^b	>8 years	0	4030	39	301
Periflex ^b	Child/Adult	0	1850	20	411
Phlexy-10 System ^b	Child/Adult	0	970	8.33	69
Drink Mix		0	970	8.33	156
20gm Bar – 1 each		0	970	8.33	33
Capsules – 20 each					
Phenex – 1 ^c	Infant/Toddler	0	1500	15	480
Phenex – 2 ^c	Child/Adult	0	2440	30	410
PhenylAde Drink Mix ^d	Child/Adult	0	2313	25	410
PhenylAde Bar ^d	Child/Adult	0	924	10	260

^aMead Johnson
<http://www.meadjohnson.com/metabolics>

^bScientific Hospital Supply
<http://www.shsna.com/>

^cRoss Laboratories
<http://www.ross.com/>

^dApplied Nutrition Corporation
<http://www.appliednutritioncorp.com/>

FOOD COMPANIES

Loprofin Products
888-567-7646
<http://www.shsna.com/>

Dietary Specialties
888-640-2880
<http://www.dietspec.com/>

Med-Diet
800-633-3438
<http://www.med-diet.com/>

Ener-G
800-331-5222
<http://www.ener-g.com/>

Cambrooke Foods
866-456-9776
<http://www.cambrookefoods.com/>

Applied Nutrition
800-605-0410
<http://www.appliednutritioncorp.com/>

METABOLIC TREATMENT CENTERS IN MISSOURI

University of Missouri Hospitals & Clinics
One Hospital Drive
Columbia, MO 65212
(573) 882-6991

Cardinal Glennon Children's Hospital
1465 South Grand Blvd.
St. Louis, MO 63104
(314) 577-5639

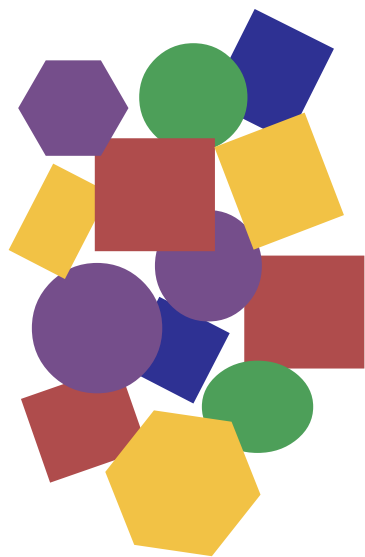
Children's Mercy Hospital
2401 Gillham Road
Kansas City, MO 64108
(816) 234-3290

St. Louis Children's Hospital
One Children's Place
St. Louis, MO 63110
(314) 454-6093

REFERENCES:

1. Acosta PB, Yannicelli S. Nutrition support of inherited disorders of amino acid metabolism: part 2. Top Clin Nutr. 1995;10:48-72.
2. Acosta PB, Yannicelli S. Nutrition support of inherited disorders of amino acid metabolism: part 1. Top Clin Nutr. 1993;9:65-82.
3. *Dietary Management of Person with Metabolic Disorders.* Evansville, Ind: Mead Johnson and Co; 1997.
4. Acosta PB, Yannicelli S. *Ross Metabolic Formula System: Nutrition Support Protocols.* Columbus, Ohio: Ross Laboratories; 1993.
5. Acosta PB, Castiglioni L, Michals K, Rohr F, Wenz E. *Protocol for Nutrition Support of Maternal PKU.* Bethesda, MD: National Institutes of Health and Human Services; 1993.
6. Williams CP, ed. *Pediatric Manual of Clinical Dietetics.* The American Dietetics Association; 1998.
7. Scriver CR, Kaufman S, Eisensmith R, Woo S. The hyperphenylalaninemias. In: Scriver CR, Beaudet AL, Sly WS, Valle D. eds., *The Metabolic Basis of Inherited Disease.* New York, NY: McGraw Hill; 1995.
8. The Florida Dietetic Association. *Handbook of Medical Nutrition Therapy:* The Florida Diet Manual, 1995.

This page intentionally left blank



Appendix

FOOD, NUTRIENT, AND DRUG INTERACTIONS

There is potential for problems resulting from interactions between medicines and foods. These problems could result in a decrease or an increase in the effectiveness of a medicine or in a compromise to a person's nutritional status. The scope of this issue is very large as it becomes increasingly difficult to be aware of all the medicines, nutritional supplements, and herbal products a patient is regularly or intermittently taking, to consult references to assess the potential interactions among them, and to advise the patient of the potential risks and how to avoid these risks. This section is not intended to be a complete description of all potential drug-nutrient interactions. Rather it is meant to explain the types of interactions that occur and to offer guidance on a select group of medicines that may be used frequently in the elderly population. Health care providers are encouraged to consult a pharmacist or current in-depth reference for additional information or for further questions.

Types of Drug-Nutrient Interactions

Medications can impact nutrients and nutritional status by limiting a patient's intake of food if gastrointestinal side effects such as anorexia, nausea, vomiting, dry mouth, or taste changes accompany the medicine. When food is consumed and is present in the gastrointestinal tract with a drug, the food may either slow absorption by altering gastric emptying, which will decrease the peak serum dose or it may extend the time a sustained release medicine is in the blood, thus increasing the length of therapy. Drugs that affect gastrointestinal transit time, pH, normal bacterial flora, or inhibit enzymes of digestion can affect absorption of both medicines and nutrients. Some drugs may be better absorbed in the absence of foods, but eating food with them may be recommended to avoid stomach upset. Both drugs and nutrients can compete for absorption sites during intestinal absorption and, once absorbed, can compete for binding sites with molecules of normal metabolism. The balance of macronutrients in the diet (protein, carbohydrate and fat) may either increase or decrease absorption of medicines and other components such as fiber can have an effect as well. The interaction between the flavonoids in grapefruit juice and intestinal enzymes used to metabolize many drugs is an example of a substance in foods that can increase the amount of active drug in the body. Many drugs use this enzyme system so the interaction is broad, affecting drugs from classes such as cardiac, sleeping pills, anti-anxiety, anti-convulsant, and anti-thrombolytic. For this reason, it may be wise to eliminate grapefruit completely from an institutional menu if these drugs are commonly used in your patient population. Orange juice does not contain the implicated flavonoid.

Effects of Nutritional Status on Medicines

Since serum proteins such as albumin transport many medicines, the decreased albumin accompanying poor nutritional status can negatively affect the transport and, therefore, effectiveness of medicines. Additionally, gastrointestinal atrophy from poor nutritional status can cause malabsorption of both food and drugs.

Impact of Aging on Drug-Nutrient Interactions

The elderly are at increased risk for drug-nutrient interactions due to a combination of factors. Increased likelihood of having multiple chronic diseases and polypharmacy, potential for compromised nutritional status, age-related changes in metabolism and excretion of drugs, age-related changes in the function of the gastrointestinal tract, and potential mental status changes and social factors can negatively impact medicine compliance and nutrient intake.

Establishing Priorities

Clearly, the area of drug-nutrient interactions changes rapidly as new drugs are developed and achieve common usage. Health care providers must identify the potential interactions from medications used

frequently by their target population. Policies should establish procedures to identify those at risk, interventions to prevent or minimize the impact, and education for the patient/family. The following table provides a sample of medicines frequently used by the elderly population that may have drug-nutrient interactions.

COMMON MEDICATIONS WITH DRUG-NUTRIENT INTERACTIONS

Drug:	Interaction:	Treatment:
Warfarin (Coumadin)	Vitamin K-containing foods compete with drug and thus lower serum levels.	Consistent intake of food high in vitamin K (primarily green, leafy vegetables but consult package literature for more extensive vitamin K content of foods). Avoiding vitamin K containing foods completely isn't necessary but a consistent intake is needed to prescribe an appropriate, consistent dosage to produce consistent serum levels.
Alendronate (Fosamax)	Food decreases bioavailability.	Take in the morning at least 30 minutes to two hours before first food or drink. Do not lie down.
Isocarboxazide (Marplan), Linezolid (Zyvox), Phenelzine Sulfate (Nardil), Selegiline (Eldepryl), Tranlycypromine (Parnate)	Inhibits tyramine metabolism and increased tyramine can increase blood pressure.	Low Tyramine Diet (see Nutrition for Special Needs section of the Missouri Diet Manual).
Nitrofurantoin (Macrobid)	Food increases bioavailability by 40%.	Take with food.
Sucralfate (Carafate)	Food decreases effect of medicine as sucralfate binds to protein in foods.	Take 1 hour before or 2 hours after meals; avoid antacids within 30 minutes of dose.
Tetracycline	Iron decreases absorption by 80%, dairy products decrease absorption by 65%; mixed diet decreases absorption by 45%.	Take 1 hour before or 2 hours after meals. Avoid dairy and iron-containing foods for three hours of dose.

REFERENCES:

1. Chernoff, Ronni. Geriatric Nutrition: The Health Professional's Handbook. Gaithersburg, Maryland: Aspen Publishers. 1991.
2. Grant, Anne, Susan, DeHoog. Nutrition Assessment, Support and Management, 5th Edition. Published by Anne Grant and Susan DeHoog. 1999.
3. McCarthy, Mary, Fabling, Janet, Bell, David. Drug-Nutrient Interactions in Nutritional Considerations in the Intensive Care Unit. American Society for Enteral and Parenteral Nutrition. 2002.
4. Pronsky, Zaneta M., Food Medication Interactions, 12th Edition, Birchrunille, Pennsylvania. 2002.

CAFFEINE CONTENT OF BEVERAGES

BEVERAGE	CAFFEINE IN Mg
Coffee	
Brewed, 6 oz.	103
Instant, 1 tsp, rounded	57
Instant, decaffeinated, 1 tsp. rounded	2
Coffee Drinks	
Orange cappuccino	75
Café Amaretto, Café Vienna	60
Café Francais	50
Suisse Mocha	40
Dutch Chocolate Mint	30
Viennese Chocolate Café	25
Tea	
Brewed 3 minutes, 6 oz.	36
Instant tea, 1 tsp.	31
Herbal teas	0
Soft Drinks, 12 oz.	
Mountain Dew	54
Mellow Yellow	52
Diet and regular cherry cola	48
Coke Classic, Cherry Coke, Diet Coke, Tab	46
Mr. Pibb	40
Pepsi Cola	38
Pepper type	37
Diet Pepsi	36
Sprite, 7-Up, Slice	0
Any decaffeinated sodas	0
Cocoa Drinks	
Chocolate flavor mix in milk, 2-3 heaping tsp.	8
Chocolate syrup, 2 Tbsp.	6
Hot cocoa, 1 oz. packet	5

SIGNIFICANT SOURCES OF CALCIUM

	<u>FOOD</u>	<u>AMOUNT</u>	<u>CALCIUM (mg.)</u>
Meat Substitutes	Salmon, canned w/bones	3 ounces	203-212
	Sardines, canned w/bones	3 ounces	321
	Tofu, firm	1/2 cup	258
	Tofu, regular	1/2 cup	130
Milk, Yogurt, and Cheese	Cheese:		
	Cottage, 2% fat	1 cup	155
	Cheddar	1 ounce	204
	American	1 ounce	124
	Mozzarella, part skim	1 ounce	183
	Swiss	1 ounce	272
	Ricotta, part skim	1 ounce	337
	Monterey	1 ounce	212
	Milk:		
	Skim	1 cup	302
	1%	1 cup	300
	2%	1 cup	297
	Whole	1 cup	291
	Buttermilk	1 cup	285
	Chocolate milk, 2%	1 cup	284
	Chocolate milk, whole	1 cup	280
	Evaporated, canned	1/2 cup	318-329
	Powdered, skim, dry	1/4 cup	377
	Yogurt:		
	Yogurt, plain, nonfat	1 cup	452
	Yogurt, plain, low fat	1 cup	415
	Yogurt, fruit-flavored, low fat	1 cup	314
	Yogurt, whole milk	1 cup	274
Bread, Cereal, Rice, and Pasta	Waffle, homemade	1 large	154
	Oatmeal, instant	3/4 cup	163
Fruits	Rhubarb	1/2 cup	174
	Spinach, cooked	1/2 cup	135-139
	Collards, frozen, cooked	1/2 cup	179
	Kale, frozen, cooked	1/2 cup	90
	Mustard greens, cooked	1/2 cup	75
	Okra, frozen, cooked	1/2 cup	88
	Turnip greens, cooked	1/2 cup	99
	Orange juice w/added calcium	1/2 cup	150
Nuts		1/4 cup	92
Desserts and Sweets	Yogurt, frozen, plain	1/2 cup	103
	Ice milk, soft-serve	1/2 cup	138
	Ice cream, soft-serve	1/2 cup	113
	Ice milk, hardened	1/2 cup	92
	Ice cream, hardened, 10% fat	1/2 cup	85
	Ice cream, hardened 16% fat	1/2 cup	87
	Pudding, cooked	1/2 cup	152
	Custard, baked	1/2 cup	149
	Chocolate cream pie	1/8 of 9" pie	96
	Milkshake, Vanilla	11 ounces	457

REFERENCES:

1. Mahan, L. K., Arlin, M. Krause's Food, Nutrition and Diet Therapy 8th edition, W. B. Saunders Co., Harcourt, Brace, Jovanovich, Inc. 1992.
2. National Dairy Council, The All American Guide To Calcium-Rich Foods, Rosemont, IL, 1994.
3. Pennington, Jean. Bowes and Church, 15th Edition, Food Values of Portions Commonly Used, Harper Perennial, 1989.

AVERAGE CHOLESTEROL CONTENT OF FOODS

These figures are not absolute. They are derived from values compiled by the United States Department of Agriculture (USDA). Laboratories differ in methods; food samples differ in origin; and, there are many other variable factors. Nevertheless, an important and valid function of this chart is to indicate the relative cholesterol values of different types of foods. For example, foods of animal origin always contain cholesterol, whereas foods derived from plants contain no cholesterol. The fact that meat or fish is lean does not necessarily indicate that it is low in cholesterol.

<u>FOOD</u>	<u>AMOUNT</u>	<u>CHOLESTEROL (mg.)</u>
Beef, lean cooked	3 ounces	75.0
Butter	1 teaspoon	11.0
Cheeses:		
Cheddar	1 ounce	30.0
Cottage, 1%	1/2 cup	5.0
Cottage, 4%	1/2 cup	17.0
Cream	1 ounce or 1 tablespoon	31.0
Mozzarella, part skim	1 ounce	16.0
Ricotta, whole milk	1 ounce	16.0
American spread	1 ounce	27.0
Chicken, light (no skin)	3 ounces	60.0
Chicken, dark (no skin)	3 ounces	80.0
*Egg Yolk	Large egg, 17 gm	213.0
White	Large egg, 17 gm	0.0
Fish:		
Clams, meat only	3 ounces	2.9
Cod, flounder, halibut, trout	3 ounces	45.0
Crab meat		
Alaskan	3 ounces	35.0
Blue	3 ounces	66.0
Haddock, broiled	3 ounces	49.0
Herring, raw	3 ounces	72.8
Lobster, raw	3 ounces	171.4
Salmon, broiled	3 ounces	47.0
Tuna		
packed in oil	3 ounces	29.5
packed in water	3 ounces	19.3
Oysters, canned	3 ounces	93.0
Sardines, canned in oil	8 medium	120.0
Scallops, steamed	3 ounces	45.0
Shrimp, raw or wet packed can	3 ounces	130.0
Ice cream:		
10% butterfat	1 cup	59.0
16% butterfat	1 cup	88.0
Ice milk	1 cup	13.0
Lamb	3 ounces	83.0
Milk:		
Whole, 3.5%	8 ounces	34.0
2%	8 ounces	18.0
Skim	8 ounces	5.0

*Nutrition Close-up, VOL 6, number 2, 1089, Egg Nutrition Center list cholesterol content of average large egg is 213 mg.

<u>FOOD</u>	<u>AMOUNT</u>	<u>CHOLESTEROL (mg.)</u>
Cream:		
Light, coffee/table	1 tablespoon	10.0
Heavy	1 tablespoon	21.0
Half and Half	1 tablespoon	6.0
Sour, cultured	1 tablespoon	5.0
Organ Meats:		
Gizzard, cooked	3	166.2
Heart, cooked	3 ounces	207.4
Kidney, cooked	3 ounces	321.4
Liver, cooked	3 ounces	375.4
Brains	3 1/2 ounces	1785.0
Pork, lean cooked	3 ounces	79.0
Rabbit, cooked	3 ounces	55.7
Salad dressings:		
Mayonnaise, soybean	1 teaspoon	8.0
Mayonnaise type	1 teaspoon	4.0
Sherbet	1 cup	14.0
Turkey, without skin	3 ounces	15.8
Veal, lean cooked	3 ounces	128.0
Yogurt:		
Low fat plain	1 cup	14.0
Low fat flavored	1 cup	11.0
Whole milk, plain	1 cup	29.0
*Game		
Buffalo	3 1/2 ounces	62.0
White tail deer	3 1/2 ounces	116.0
Elk	3 1/2 ounces	67.0
Moose	3 1/2 ounces	71.0
Antelope	3 1/2 ounces	112.0
Squirrel	3 1/2 ounces	82.0
Rabbit		
Cottontail	3 1/2 ounces	77.0
Jackrabbit	3 1/2 ounces	131.0
*Wild turkey	3 1/2 ounces	55.0
*Wild pheasant	3 1/2 ounces	52.0
*Dove	3 1/2 ounces	94.0
*Snow geese	3 1/2 ounces	142.0
*Mallard	3 1/2 ounces	140.0
*Pigeon	3 1/2 ounces	131.0

*Going Wild A Guide to Field Dressing, Butchering, Sausage-Making and Cooking; Watab Marketing, Inc.; Sartell, M.N.; 1987.

FOLATE RICH FOODS

FOOD	SERVING SIZE	DIETARY FOLATE EQUIVALENT (DFE) mcg.
Chicken liver	3 ounces	660
Chicken giblets	3 ounces	324
Dried peas	1 cup cooked	280
Dried beans	1 cup cooked	260
Cereal fortified to 50-75% of the daily value	1 serving*	200 +
Cereal fortified to 25% of the daily value (most brands)	1 serving*	100-199
Beef liver	3 ounces	186
Lima beans	1 cup cooked	156
Pork liver	3 ounces	140
Asparagus	1/2 cup	131
Orange juice	8 oz. made from concentrate	110
Spinach	1 cup raw	108
Spinach	1/2 cup	102
Turnip greens	1/2 cup	85
Rice, cooked	1/2 cup	76
Brussels sprouts	1/2 cup	78
Broccoli	1/2 cup	39
White bread	1 slice	34
Wheat bread	1 slice	14

Outstanding source – 200 or more mcg DFE

Excellent source – 100-199 mcg DFE

Good source – 40-99 mcg DFE

*Folate values vary depending on the cereal. Check the food label for specific details. Daily consumption of 1 or more servings is recommended for pregnant or lactating women.

FOODS HIGH IN IRON

	<u>FOOD</u>	<u>AMOUNT</u>	<u>IRON (mg)</u>
Cereal	Cereal, Ready-to-Eat	3/4 cup	1-18 (varies)
	Cream of Wheat	3/4 cup	8
	Oatmeal	3/4 cup	4-8 (varies)
Grains	Pasta, enriched, cooked	1 cup	2.4
	Wheat germ, toasted	1/4 cup	2.6
	Rice, white, enriched	1 cup	1.8
	Rice Bran	1 ounces	2.3
	Pop tart, fortified	1	2.0
	Oat Bran	1 ounces	1.6
Dried Peas and Beans (cooked)	Baked Beans	1/2 cup	2.5
	Chickpeas	1/2 cup	2.4
	Cowpeas	1/2 cup	2.2
	Great Northern	1/2 cup	1.9
	Kidney Beans	1/2 cup	2.1
	Lentils	1/2 cup	3.3
	Lima Beans	1/2 cup	2.6
	Navy Beans	1/2 cup	2.3
	Pinto Beans	1/2 cup	2.2
	Soybeans, mature boiled	1/2 cup	4.4
	White Beans	1/2 cup	3.2
Dried Fruits	Apricots	10 halves	1.7
	Dates	10	1.0
	Figs	10	4.2
	Longans	3.5 ounces	5.4
	Lychees	3.5 ounces	1.7
	Mixed Fruit	3.5 ounces	2.7
	Peaches	10 halves	5.3
	Pears	10 halves	3.7
	Prunes	10	2.1
	Prunes, dried, cooked	1/2 cup	1.2
	Prune juice	1/2 cup	1.5
	Raisins, seedless	2/3 cup	2.1
Meat (cooked)	Veal	3 1/2 ounces	3.0
	Beef	3 1/2 ounces	3.5
	Pork	3 1/2 ounces	1.0
	Turkey	3 1/2 ounces	1.0
	Chicken	3 1/2 ounces	1.3
	Heart, beef	3 1/2 ounces	7.5
	Liver, beef	3 1/2 ounces	6.8
	Liver, pork	3 1/2 ounces	18.0
	Liver, chicken	3 1/2 ounces	8.5
	Braunschweiger	2 ounces	5.3
	Venison	3 ounces	3.8

	<u>FOOD</u>	<u>AMOUNT</u>	<u>IRON (mg)</u>
Fish and Seafood	Fish	3 1/2 ounces	1.0
	Clams, canned	3 ounces	23.7
	Oysters, canned	3 ounces	5.7
	Shrimp	3 ounces	2.2
Vegetables	Asparagus, canned	1/2 cup	2.2
	Avocado	1 medium	1.6-2.0
	Beet greens	1/2 cup	1.4
	Chard, swiss, cooked	1/2 cup	2.0
	Peas, cooked	1/2 cup	1.2
	Potato, baked, w/skin	1 medium	2.8
	Pumpkin	1/2 cup	1.7
	Spinach, cooked	1/2 cup	3.2
	Spinach, canned	1/2 cup	2.5
	Turnip, greens	1/2 cup	1.8
Others	Molasses, Blackstrap	1 tablespoon	3.2
	Tofu, raw	1/2 cup	6.7
	Tofu, raw, firm	1/2 cup	13.2

REFERENCES:

1. Mahan, L.K, Arlen, M., Krause's Food, Nutrition, and Diet Therapy, 8th Edition, W.B. Saunders Company, Harcourt Brace Jovanovich, Inc., 1992.
2. Pennington, Jean, Bowes and Church, 15th Edition, Food Values of Portions Commonly Used, Harper Perennial, 1989.

MEASURE CONVERSION CHART

		<u>Approximate Equivalent</u>
1 ounce (oz)	= 28.35 grams (gm.)	= 30 gm.
1 pound (lb)	= 454 grams (gm.)	
1 kilogram (kg)	= 2.2 pounds	
1 fluid ounce (fl oz)	= 28.41 milliliters (ml.)	= 30 ml.
1 fluid ounce (fl oz)	= 29.57 cubic centimeters (cc)	= 30 cc.
1 cup (c)	= 237 milliliters (ml.)	= 240 cc or 8 fl oz
1 tablespoon (fluids)		= 1/2 fl oz or 15 cc or 3 tsps.
1 teaspoon		= 1/8 fl oz or 4 cc
1 pint (pt)	= 473 ml.	
1 quart (qt)	= 946 ml.	
1 liter (1000 ml.)	= 33.8 fl oz	
1 inch (in)	= 2.54 cm.	
1 foot (ft)	= 30.48 cm.	= 30 cm.
1 mile	= 1.609 km.	
1 centimeter (cm)	= 0.39 in.	
1 meter (m)	= 100 cm. or 39.37 in.	
1 kilometer (km)	= 0.6214 mile	

ENERGY

Total energy expenditure includes the energy expended at rest, in physical activity and as a result of thermogenesis. These components can be affected by many variables, including age, sex, body size and composition, genetic factors, energy intake, physiologic state (as growth, pregnancy, and lactation) coexisting, pathological conditions, and ambient temperature.

Unless levels of physical activity are very high, the resting energy expenditure (REE) is the largest component of energy expenditure. REE represents the energy expended by a person at rest under conditions of thermal neutrality while the Basal Metabolic Rate (BMR) is defined as the REE measured soon after awakening at least 12 hours after the last meal. BMR and REE differ by less than 10% and the terms are interchangeable.

Many investigators use the equations of Harris and Benedict (1919) to determine BMR. The values calculated by these equations do not differ significantly from those values calculated from World Health Organization (WHO) equations for predicting REE from body weight and approximating the energy expenditure with use of an activity factor.

REE is closely correlated with lean body mass. REE is estimated by using several empirically derived equations that take into account age, sex and weight, but ignore height.

APPROXIMATING IDEAL BODY WEIGHT FOR ADULTS

WEIGHT AND HEIGHT

<u>BUILD</u>	<u>WOMEN</u>	<u>MEN</u>
Medium	Allow 100 lbs. for first 5 ft. of height, plus 5 lbs. for each additional inch. Can allow a range of + or – 5 lbs. for final figure.	Allow 106 lbs. for first 5 ft. of height, plus 6 lbs. for each additional inch. Can allow a range of + or – 5 lbs. for final figure.
Small	Subtract 10%	Subtract 10%
Large	Add 10%	Add 10%

FRAME SIZE ESTIMATION (Predicts rough estimate of frame size.)

The wrist is measured in inches at the smallest circumference. Use height without shoes.

<u>HEIGHT</u>	<u>SMALL BONED</u>	<u>MEDIUM BONED</u>	<u>LARGE BONED</u>
5'2" and under	Less than 5 1/2"	5 1/2" – 5 3/4"	Over 5 3/4"
5'3", 5'4"	Less than 6"	6" – 6 1/4"	Over 6 1/4"
5'5" and over	Less than 6 1/4"	6 1/4" – 6 1/2"	Over 6 1/2"

HARRIS-BENEDICT EQUATION

Men: $BEE = 66.5 + (13.8 \times W) + (5.0 \times H) - (6.8 \times A)$

Women: $BEE = 655 + (9.6 \times W) + (1.8 \times H) - (4.7 \times A)$

W = weight in kilograms (kg)

H = height in centimeters

A = age

Obese: For those greater than 125% of their ideal body weight the following formula is used:

$[(ABW - IBW) \times 0.25] + IBW = \text{weight in KG for BEE and protein requirements}$

ABW = actual body weight

IBW = ideal body weight

0.25 = 25% of body fat tissue is metabolically active

Activity Factors:

Confirmed to bed = 1.2

Out of bed = 1.3

Injury Factors:

Surgery

Minor = 1.0 – 1.1

Major = 1.1 – 1.2

Infection

Mild = 1.0 – 1.2

Moderate = 1.2 – 1.4

Severe = 1.4 – 1.8

Trauma

Skeletal = 1.2 – 1.35

Blunt = 1.15 – 1.35

Burns

Up to 20% body surface area (BSA) = 1.0 – 1.5

20-40% BSA = 1.5 – 1.85

> 40% BSA = 1.85 – 1.95

REFERENCE:

American Dietetic Association, Manual of Clinical Dietetics, 4th Edition, 1992.

EQUATIONS FOR PREDICTING RESTING ENERGY EXPENDITURE FROM BODY WEIGHT¹

Sex and Age Range (years)	Equation to derive REE in kcal/day	R ²	SD ²
Males			
0-3	$(60.9 \times \text{wt}^3) - 54$	0.97	53
3-10	$(22.7 \times \text{wt}) + 495$	0.86	62
10-18	$(17.5 \times \text{wt}) + 651$	0.90	100
18-30	$(15.3 \times \text{wt}) + 679$	0.65	151
30-60	$(11.6 \times \text{wt}) + 879$	0.60	164
>60	$(13.5 \times \text{wt}) + 487$	0.79	148
Females			
0-3	$(61.0 \times \text{wt}) - 51$	0.97	61
3-10	$(22.5 \times \text{wt}) + 499$	0.85	63
10-18	$(12.2 \times \text{wt}) + 746$	0.75	117
18-30	$(14.7 \times \text{wt}) + 496$	0.72	121
30-60	$(8.7 \times \text{wt}) + 829$	0.70	108
>60	$(10.5 \times \text{wt}) + 596$	0.74	108

¹ From WHO (1985). These equations were derived from BMR data.

² Correlation coefficient (R) of reported BMRs and predicted values, and standard deviation (SD) of the differences between actual and computed values.

³ Weight of person in kilograms.

**APPROXIMATE ENERGY EXPENDITURE FOR VARIOUS ACTIVITIES IN
RELATION TO RESTING NEEDS FOR MALES AND FEMALES OF
AVERAGE SIZE ¹**

Activity Category ²	Representative Value for Activity Factor Per Unit Time of Activity
Resting	REE x 1.0
Sleeping, reclining	
Very light	REE x 1.5
Seated and standing activities, painting trades, driving, laboratory work, typing, sewing, ironing, cooking, playing cards, playing a musical instrument	
Light	REE x 2.5
Walking on a level surface at 2.5 to 3 mph, garage work, electrical trades, carpentry, restaurant trades, house-cleaning, child care, golf, sailing, table tennis	
Moderate	REE x 5.0
Walking 3.5 to 4 mph, weeding and hoeing, carrying a load, cycling, skiing, tennis, dancing	
Heavy	REE x 7.0
Walking with load uphill, tree felling, heavy manual digging, basketball, climbing, football, soccer	

¹ Based on values reported by Durnin and Passmore (1967) and WHO (1985).

² When reported as multiples of basal needs, the expenditures of males and females are similar.

**EXAMPLE OF CALCULATION OF ESTIMATED DAILY ENERGY
ALLOWANCES FOR EXCEPTIONALLY ACTIVE AND INACTIVE 23-YEAR-
OLD ADULTS**

STEP 1: DERIVATION OF ACTIVITY FACTOR ¹				
Activity as Multiples of REE	Very Sedentary Day		Very Active Day	
	Duration (hr)	Weighted REE Factor	Duration (hr)	Weighted REE Factor
Resting 1.0	10	10.0	8	8.0
Very light 1.5	12	18.0	8	12.0
Light 2.5	2	5.0	4	10.0
Moderate 5.0	0	0	2	10.0
Heavy 7.0	0	0	2	14.0
TOTAL	24	33.0	24	54.0
MEAN		1.375		2.25

STEP 2: CALCULATION OF ENERGY REQUIREMENT, KCAL PER DAY

Gender	Resting Energy Expenditure	Very Sedentary Day (REE x 1.375)	Very Active Day (REE x 2.25)
Male, 70 kg	1,750	2,406	3,398
Female, 58 kg	1,350	1,856	3,098

¹ Activity patterns are hypothetical. As an example of use of the ranges within a class of activity very light activity is divided between sitting and standing activities.

**FACTORS FOR ESTIMATING DAILY ENERGY ALLOWANCES AT
VARIOUS LEVELS OF PHYSICAL ACTIVITY FOR MEN AND WOMEN
(AGES 19 TO 50)**

Level of Activity	Activity Factor ¹ (x REE)	Energy Expenditure ² (kcal/kg per day)
Very light		
Men	1.3	31
Women	1.3	30
Light		
Men	1.6	38
Women	1.5	35
Moderate		
Men	1.7	41
Women	1.6	37
Heavy		
Men	2.1	50
Women	1.9	44
Exceptional		
Men	2.4	58
Women	2.2	51

¹ Based on examples presented by WHO (1985).

² REE was computed from formulas in Table 3-1 and is the average of values for median weights of persons ages 19 to 24 and 25 to 74 years: males 24.0 kcal/kg; females 23.2 kcal/kg.

**Median Heights and Weights
and Recommended Energy Intake***

							<u>Average Energy Allowance (kcal)</u>	
Category	Age (years) or Condition	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	REE ¹ (kcal/day)	Multiples of REE	
Infants	0.0-0.5	6	13	60	24	320		108
	0.5-1.0	9	20	71	28	500		98
Children	1-3	13	29	90	35	740		102
	4-6	20	44	112	44	950		90
	7-10	28	62	131	52	1,130		70
Males	11-14	45	99	157	62	1,440	1.70	55
	15-18	66	145	176	69	1,760	1.67	45
	19-24	72	160	177	70	1,780	1.67	40
	25-50	79	174	176	70	1,800	1.60	37
	51+	77	170	173	68	1,530	1.50	30
Females	11-14	46	101	157	62	1,310	1.67	47
	15-18	55	120	163	64	1,370	1.60	40
	19-24	58	128	164	65	1,350	1.60	38
	25-50	63	138	163	64	1,380	1.55	36
	51+	65	143	160	63	1,280	1.50	30
Pregnant	1 st trimester							+0
	2 nd trimester							+300
	3 rd trimester							+300
Lactating	1 st 6 months							+500
	2 nd 6 months							+500

¹Calculation of REE (Resting Energy Expenditure) based on FAO equations, then rounded.

²In the range of light to moderate activity, the coefficient of variation is $\pm 20\%$.

*Recommended Dietary Allowances, c. 1989, by the National Academy of Sciences, National Academy Press, Washington D.C.

ADJUSTMENT OF DESIRABLE BODY WEIGHT FOR AMPUTATIONS

The percentages listed below are estimates as body proportions vary in individuals. Use of these percentages provides an approximation of desirable body weight, which is more accurate than a comparison with the standards for normal adults.

TYPE OF AMPUTATION	PERCENTAGES OF TOTAL BODY WEIGHT
Foot	1.8%
Below Knee	6.0%
Above Knee	15.0%
Entire Lower Extremity	18.5%
Hand	1.0%
Below Elbow	3.0%
Entire Upper Extremity	6.5%

Begin with the patient's approximate height before the amputation.* Use this height to calculate the desirable body weight for the normal adult. Then adjust the figures according to the type of amputation performed.

Example: To determine the desirable body weight for a 5'10" man with a below the knee amputation:

1. Calculate desirable body weight for a 5'10" man 166 lbs
2. Subtract weight of amputated limb (6.0%) $166 \times .06 = 9.86$ (approx. 10 lbs.) -10 lbs.
3. Desirable weight of 5'10" man with a below the knee amputation. 156 lbs.

*Span measurements is a rough estimate of height at maturity and is calculated as follows: With the upper extremities including the hands fully extended and parallel to the ground, measure the distance between the tip of one middle finger and tip of the other middle finger.

REFERENCE:

1. Brunnstrom, S., *Clinical Kinesiology*, F.A. Davis Co., Philadelphia, 1972.

1959 METROPOLITAN HEIGHT AND WEIGHT TABLES FOR ADULTS

Men (wearing indoor clothing*; height without shoes)

			Small Frame		Medium Frame		Large Frame	
Feet	Inches	Cms.	Pounds	Kilograms	Pounds	Kilograms	Pounds	Kilograms
5	1	154.9	112-120	50.9-54.5	118-129	53.6-58.6	126-141	57.2-64.1
5	2	157.5	115-123	52.3-55.9	121-133	55.0-60.5	129-144	58.6-65.5
5	3	160.0	118-126	53.6-57.3	124-136	56.4-61.8	132-148	60.0-67.3
5	4	162.6	121-129	55.0-58.6	127-139	59.1-63.2	135-152	61.4-69.1
5	5	165.1	124-133	56.4-60.5	130-143	60.9-65.0	138-156	62.7-70.9
5	6	167.6	128-137	58.2-62.3	134-147	62.7-66.8	142-161	64.5-73.2
5	7	170.2	132-141	60.0-64.1	138-152	64.5-69.1	147-166	66.8-75.5
5	8	172.7	136-145	61.8-65.9	142-156	66.4-70.9	151-170	68.6-77.3
5	9	175.3	140-150	63.6-68.2	146-160	68.1-72.7	155-174	70.5-79.1
5	10	177.8	144-154	65.5-70.0	150-165	71.8-75.0	159-179	72.3-81.4
5	11	180.2	148-158	67.2-71.8	154-170	68.2-77.3	164-184	74.5-83.6
6	0	182.9	152-162	69.1-73.6	158-175	71.8-79.5	168-189	76.4-85.9
6	1	185.4	156-167	70.9-75.9	162-180	73.6-81.8	172-194	78.6-88.2
6	2	188.0	160-171	72.7-77.7	167-185	75.9-84.1	178-199	80.9-90.5
6	3	190.5	164-175	74.5-79.5	172-190	78.2-86.4	182-204	82.7-92.7

*allow 7 pounds

Women (wearing indoor clothing**; height without shoes)

			Small Frame		Medium Frame		Large Frame	
Feet	Inches	Cms.	Pounds	Kilograms	Pounds	Kilograms	Pounds	Kilograms
4	8	142.3	92-98	41.8-44.5	96-107	43.6-48.6	104-119	47.3-54.1
4	9	144.8	94-101	42.7-45.9	98-110	44.5-50.0	106-122	48.2-55.5
4	10	147.2	96-104	43.6-47.3	101-113	45.9-51.4	109-125	49.5-56.8
4	11	149.9	99-107	45.0-48.6	104-116	47.3-52.7	112-128	50.9-58.2
5	0	152.4	102-110	46.4-50.0	107-119	48.6-54.1	115-131	52.3-59.5
5	1	154.9	105-113	47.7-51.4	110-122	50.0-55.5	118-134	53.6-60.9
5	2	157.5	108-116	49.1-52.7	113-126	51.4-57.3	121-138	55.0-62.7
5	3	160.0	111-119	50.5-54.1	116-130	52.7-59.1	125-142	56.8-64.5
5	4	162.6	114-123	51.8-55.9	120-135	54.5-61.4	129-146	58.6-66.4
5	5	165.1	118-127	53.6-57.7	124-139	56.4-63.2	130-150	60.5-68.2
5	6	167.6	122-131	55.5-59.5	128-143	58.2-65.0	137-154	62.3-70.0
5	7	170.2	126-135	57.3-61.4	132-147	60.0-66.8	141-158	64.1-71.8
5	8	172.7	130-140	59.1-63.6	136-151	61.8-68.6	145-163	65.9-74.1
5	9	175.3	134-144	60.9-65.5	140-155	63.6-70.5	149-168	67.7-76.4
5	10	177.8	138-148	62.7-67.3	144-159	65.5-72.3	153-173	69.5-78.6

**allow 4 pounds

Adapted from the Metropolitan Life Insurance Company; data derived primarily from Build and Blood Pressure Study, 1959 Society of Actuaries.

1983 METROPOLITAN HEIGHT AND WEIGHT TABLES FOR ADULTS

Men (wearing indoor clothing* and shoes with 1-inch heels)

Feet	Inches	Cms.	Small Frame		Medium Frame		Large Frame	
			Pounds	Kilograms	Pounds	Kilograms	Pounds	Kilograms
5	1	154.9	128-134	58.2-60.9	131-141	59.5-64.1	138-150	62.7-68.2
5	2	157.5	130-136	59.1-61.8	133-143	60.4-65.0	140-153	63.6-69.5
5	3	160.0	132-138	60.0-62.7	135-145	61.4-65.9	142-156	64.5-70.9
5	4	162.6	134-140	60.9-63.6	137-148	62.3-67.2	144-160	65.5-72.7
5	5	165.1	136-142	61.8-64.5	139-151	63.2-68.6	146-164	66.4-74.5
5	6	167.6	138-145	62.7-65.9	142-154	64.5-70.0	149-168	67.7-76.4
5	7	170.2	140-148	63.6-67.2	145-157	65.9-71.4	152-172	69.1-78.2
5	8	172.7	142-151	64.5-68.6	148-160	67.2-72.7	155-176	70.5-80.0
5	9	175.3	144-154	65.5-70.0	151-153	68.6-74.1	158-180	71.8-81.8
5	10	177.8	146-157	66.4-71.4	154-166	70.0-75.5	161-184	73.2-83.6
5	11	180.2	149-160	67.7-72.7	157-170	71.4-77.3	164-188	74.5-85.5
6	0	182.9	152-164	69.1-74.5	160-174	72.7-79.1	168-192	76.4-87.3
6	1	185.4	155-168	70.5-76.4	164-178	74.5-80.9	172-197	78.2-89.5
6	2	188.0	158-172	71.8-78.2	167-182	75.9-82.7	176-202	80.0-91.8
6	3	190.5	162-176	73.6-80.0	171-181	77.7-85.0	181-207	82.3-94.1

*allow 5 pounds

Women (wearing indoor clothing** and shoes with 1-inch heels)

Feet	Inches	Cms.	Small Frame		Medium Frame		Large Frame	
			Pounds	Kilograms	Pounds	Kilograms	Pounds	Kilograms
4	9	144.8	102-111	46.4-50.0	109-121	49.5-55.0	118-131	53.6-59.5
4	10	147.3	103-113	46.8-51.4	111-123	50.0-55.9	120-134	54.5-60.9
4	11	149.9	104-115	47.3-52.3	113-126	51.3-57.2	122-137	55.5-62.3
5	0	152.4	106-118	48.2-53.6	115-129	52.3-58.6	125-140	56.8-63.6
5	1	154.9	108-121	49.1-55.0	118-132	53.6-60.0	128-143	58.2-65.0
5	2	157.5	111-124	50.5-56.4	121-135	55.0-61.4	131-147	59.5-66.8
5	3	160.0	114-127	51.8-57.7	124-138	56.4-62.7	134-151	60.9-68.6
5	4	162.6	117-130	53.2-59.0	127-141	57.7-64.1	137-155	62.3-70.5
5	5	165.1	120-133	54.5-60.5	130-144	59.0-65.5	140-159	63.6-72.3
5	6	167.6	123-136	55.9-61.8	133-147	60.5-66.8	143-163	65.0-74.1
5	7	170.2	126-139	57.3-63.2	136-150	61.8-68.2	146-167	66.4-75.9
5	8	172.7	129-142	58.6-64.5	139-153	63.2-69.5	149-170	67.7-77.3
5	9	175.3	132-145	60.0-65.9	142-156	64.6-70.9	152-173	69.1-78.6
5	10	177.8	135-148	61.4-67.3	145-159	65.9-72.3	155-176	70.5-80.0
5	11	180.3	138-151	62.7-73.6	148-162	67.3-73.6	158-179	71.8-81.4

**allow 3 pounds

Weights for adults aged 25 to 59 years based on lowest mortality.

The 1983 Metropolitan height and weight tables are based on the 1979 Build Study which followed approximately four million insurance policy holders for about 20 years. As with the 1959 study, only healthy subjects were included and the population may not be representative of the population as a whole.

**AVERAGE HEIGHT-WEIGHT TABLE
FOR PERSONS 65 YEARS OF AGE AND OVER
(weight in pounds)**

MEN

HEIGHT IN INCHES	Ages 65-69	Ages 70-74	Ages 75-79	Ages 80-84	Ages 85-89	Ages 90-94
61	128-156	125-153	123-151			
62	130-158	127-155	125-153	122-148		
63	131-161	129-157	127-155	122-150	120-146	
64	134-164	131-161	129-157	124-152	122-148	
65	136-166	134-164	130-160	127-155	125-153	117-143
66	139-169	137-167	133-163	130-158	128-156	120-146
67	140-172	140-170	136-166	132-162	130-160	122-150
68	143-175	142-174	139-169	135-165	133-163	126-154
69	147-179	146-178	142-174	139-169	137-167	130-158
70	150-184	148-182	146-178	143-175	140-172	134-164
71	155-189	152-186	149-183	148-180	144-176	139-169
72	159-195	156-190	154-188	153-187	148-182	
73	164-200	160-196	158-192			

WOMEN

HEIGHT IN INCHES	Ages 65-69	Ages 70-74	Ages 75-79	Ages 80-84	Ages 85-89	Ages 90-94
58	120-146	112-138	111-135			
59	121-147	114-140	112-136	100-122	99-121	
60	122-148	116-142	113-139	106-130	102-124	
61	123-151	118-144	115-141	109-133	104-128	
62	125-153	121-147	118-144	112-136	108-132	107-131
63	127-155	123-151	121-147	115-141	112-136	107-131
64	130-158	126-154	123-151	119-145	115-141	108-132
65	132-162	130-158	126-154	122-150	120-146	112-136
66	136-166	132-162	128-157	126-154	124-152	116-142
67	140-170	136-166	131-161	130-158	128-156	
68	143-175	140-170				
69	148-180	144-176				

Adapted from a table by Arthur M. Master et al., appearing in the Journal of the American Medical Association 172:658, 1960.

Body Weights in Pounds According to Height and Body Mass Index*

Height	Body Mass Index, kg/m ²													
	19	20	21	22	23	24	25	26	27	28	29	30	35	40
<i>in</i>	Body Weight, lb													
58	91	96	100	105	110	115	119	124	129	134	138	143	167	191
59	94	99	104	109	114	119	124	128	133	138	143	148	173	198
60	97	102	107	112	118	123	128	133	138	143	148	153	179	204
61	100	106	111	116	122	127	132	137	143	148	153	158	185	211
62	104	109	115	120	126	131	136	142	147	153	158	164	191	218
63	107	113	118	124	130	135	141	146	152	158	163	169	197	225
64	110	116	122	128	134	140	145	151	157	163	169	174	204	232
65	114	120	126	132	138	144	150	156	162	168	174	180	210	240
66	117	124	130	136	142	148	155	161	167	173	179	186	216	247
67	121	127	134	140	146	153	159	166	172	178	185	191	223	255
68	125	131	138	144	151	158	164	171	177	184	190	197	230	262
69	128	135	142	149	155	162	169	176	182	189	196	203	236	270
70	132	139	146	153	160	167	174	181	188	195	202	207	243	278
71	136	143	150	157	165	172	179	186	193	200	208	215	250	286
72	140	147	154	162	169	177	184	191	199	206	213	221	258	294
73	144	151	159	166	174	182	189	197	204	212	219	227	265	302
74	148	155	163	171	179	186	194	202	210	218	225	233	272	311
75	152	160	168	176	184	192	200	208	216	224	232	240	279	319
76	156	164	172	180	189	197	205	213	221	230	238	246	287	328

*Each entry gives the body weight in pounds (lb) for a person of a given height and body mass index. Pounds have been rounded off. To use the table, find the appropriate height in the left-hand column. Move across the row to a given weight. The number at the top of the column is the body mass index for the height and weight. Adapted with permission from Bray GA, Gray DS. Obesity. Part I. Pathogenesis. West J Med. 1988; 149:429-41.

WEIGHTS FOR HEIGHT OF ADULTS IN THE UNITED STATES¹

Weight, kg (lb)

Males by percentile				Females, by percentile			
Height	cm (in)	15 th	50 th	85 th	15 th	50 th	85 th
147	(58)				45	(99)	55 (122) 72 (159)
152	(60)				49	(107)	60 (132) 75 (164)
157	(62)	57 (125)	64 (142)	76 (168)	51 (112)	60 (132)	77 (170)
163	(64)	58 (129)	67 (148)	79 (174)	54 (118)	63 (139)	79 (175)
168	(66)	61 (134)	71 (158)	83 (183)	55 (122)	64 (141)	81 (179)
173	(68)	65 (143)	76 (167)	88 (195)	59 (130)	67 (148)	83 (184)
178	(70)	67 (149)	79 (173)	93 (206)	61 (133)	69 (152)	78 (171)
183	(72)	73 (161)	83 (183)	99 (218)			
188	(74)	77 (171)	88 (194)	99 (217)			
193	(76)	85 (187)	103 (227)	106 (234)			

¹Unpublished data from NHANES II (1976-1980) provided by the National Center for Health Statistics. Values rounded to nearest whole number. Subjects were ages 18 to 74 years. Height determined without shoes. Weight includes clothing weight, ranging from an estimated 0.09 to 0.28 kg (0.20 to 0.62 lb).

WEIGHTS AND HEIGHTS OF MALES AND FEMALES UP TO 18 YEARS IN THE UNITED STATES¹

Age	Males, by percentile							Females, by percentile							95 th	
	Weight, kg (lb)			Height, cm (in)				Weight, kg (lb)			Height, cm (in)					
	5 th	50 th	95 th	5 th	50 th	95 th	5 th	50 th	95 th	5 th	50 th	95 th				
Months																
1	3.16	4.29	(9.4)	5.38	50.4	54.6	(21.5)	58.6	2.97	3.98	(8.8)	4.92	49.2	53.5	(21.1)	56.9
3	4.43	5.98	(13.2)	7.37	56.7	61.1	(24.1)	65.4	4.18	5.40	(11.9)	6.74	55.4	59.5	(23.4)	63.4
6	6.20	7.85	(17.3)	9.46	63.4	67.8	(26.7)	72.3	5.79	7.21	(15.9)	8.73	61.8	65.9	(25.9)	70.2
9	7.52	9.18	(20.2)	10.93	68.0	72.3	(28.5)	77.1	7.00	8.56	(18.8)	10.17	66.1	70.4	(27.7)	75.0
12	8.43	10.15	(22.3)	11.99	71.7	76.1	(30.0)	81.2	7.84	9.53	(21.0)	11.24	69.8	74.3	(29.3)	79.1
18	9.59	11.47	(25.2)	13.44	77.5	82.4	(32.4)	88.1	8.92	10.82	(23.8)	12.76	76.0	80.9	(31.9)	86.1
Years																
2	10.49	12.34	(27.1)	15.50	82.5	86.8	(34.2)	94.4	9.95	11.80	(26.0)	14.15	81.6	86.8	(34.2)	93.6
3	12.05	14.62	(32.2)	17.77	89.0	94.9	(37.4)	12.0	11.61	14.10	(31.0)	17.22	88.3	94.1	(37.0)	100.6
4	13.64	16.69	(36.7)	20.27	95.8	102.9	(40.5)	109.9	13.11	15.96	(35.1)	19.91	95.0	101.6	(40.0)	108.3
5	15.27	18.67	(41.1)	23.09	102.0	109.9	(43.3)	117.0	14.55	17.66	(38.9)	22.62	101.1	108.4	(42.7)	115.6
6	16.93	20.69	(45.5)	26.34	107.7	116.1	(45.7)	123.5	16.05	19.52	(42.9)	25.75	106.6	114.6	(45.1)	122.7
7	18.64	22.85	(50.3)	30.12	113.0	121.7	(47.9)	129.7	17.71	21.84	(48.0)	29.68	111.8	120.6	(47.5)	129.5
8	20.40	25.30	(55.7)	34.51	118.1	127.0	(50.0)	135.7	19.62	24.84	(54.6)	34.71	116.9	126.4	(49.8)	136.2
9	22.25	28.13	(61.9)	39.58	122.9	132.2	(52.0)	141.8	21.82	28.46	(62.6)	40.64	122.1	132.2	(52.0)	142.9
10	24.33	31.44	(69.2)	45.27	127.7	137.5	(54.1)	148.1	24.36	32.55	(71.6)	47.17	127.5	138.3	(54.5)	149.5
11	26.80	35.30	(77.7)	51.47	132.6	143.3	(56.4)	154.9	27.24	36.95	(81.3)	54.00	133.5	144.8	(57.0)	156.2
12	29.85	39.78	(87.5)	58.09	137.6	149.7	(58.9)	162.3	30.52	41.53	(91.4)	60.81	139.8	151.5	(59.6)	162.7
13	33.64	44.95	(98.9)	65.20	142.9	156.5	(61.6)	169.8	34.14	46.10	(101.4)	67.30	145.2	157.1	(61.9)	168.1
14	38.22	50.77	(111.7)	72.13	148.8	163.1	(64.2)	176.7	37.76	50.28	(110.6)	73.08	148.7	160.4	(63.1)	171.3
15	43.11	56.71	(124.8)	79.12	155.2	169.0	(66.5)	181.9	40.99	53.68	(118.1)	77.78	150.5	161.8	(63.7)	172.8
16	47.74	62.10	(136.6)	85.62	161.1	173.5	(68.3)	185.4	43.41	55.89	(123.0)	80.99	151.6	162.4	(63.9)	173.3
17	51.50	66.31	(145.9)	91.31	164.9	176.2	(69.4)	187.3	44.74	56.69	(124.7)	82.46	152.7	163.1	(64.2)	173.5
18	53.97	68.88	(151.5)	95.76	165.7	176.8	(69.6)	187.6	45.26	56.62	(124.6)	82.47	153.6	163.7	(64.4)	173.6

SOURCE: Adapted from Hamill et al. (1979).

¹Data in this table have been used to derive weight and height reference points in the present report. It is not intended that they necessarily be considered standards of normal growth and development. Data pertaining to infants 2 to 18 months of age are taken from longitudinal growth studies at Fels Research Institute. Ages are exact, and infants were measured in the recumbent position. The measurements were based on some 867 children followed longitudinally at the institute between 1929 and 1975. Data pertaining to children between 2 and 18 years of age were collected between 1962 and 1974 by the National Center for Health Statistics and involve some 20,000 individuals comprising nationally representative samples in three studies conducted between 1960 and 1974. In these studies, children were measured in the standing position with no upward pressure exerted on the mastoid processes.

This page intentionally left blank

GROWTH CHARTS

Birth to 36 months: Boys (page 10.25)

Length-for-age and Weight-for-age percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c017.pdf>

Birth to 36 months: Boys (page 10.26)

Head circumference-for-age and Weight-for-length percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c019.pdf>

Birth to 36 months: Girls (page 10.27)

Length-for-age and Weight-for-age percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c018.pdf>

Birth to 36 months: Girls (page 10.28)

Head circumference-for-age and Weight-for-length percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c020.pdf>

2 to 20 years: Boys (page 10.29)

Stature-for-age and Weight-for-age percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c021.pdf>

2 to 20 years: Boys (page 10.30)

Body mass index-for-age percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c023.pdf>

2 to 20 years: Girls (page 10.31)

Stature-for-age and Weight-for-age percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c022.pdf>

2 to 20 years: Girls (page 10.32)

Body mass index-for-age percentiles

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c024.pdf>

Weight for stature percentiles: Boys (page 10.33)

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c025.pdf>

Weight-for-stature percentiles: Girls (page 10.34)

<http://www.cdc.gov/nchs/data/nhanes/growthcharts/set1clinical/cj41c026.pdf>

FAILURE TO THRIVE INFANTS AND TODDLERS

Failure to thrive infants and toddlers have higher energy needs for “catch up growth”. To determine their energy needs the following formula may be used.

$$\text{Kcal/Kg} = \frac{\text{Ideal Weight for Age}^* \times \text{RDA Kcal/Kg Wt. For Age}^{**}}{\text{actual weight}}$$

*50% weight for present age

**Age at which present weight = 50%

This formula may overestimate energy requirements if the infant is well below the 5th percentile for weight for height.

FLUID/FLUID NEEDS

Water balance is achieved when intake equals output. Sources of water for the tube fed patient consist of: water in the formula, water flushes, and any intravenous fluids received.

Most one calorie per ml formulas contain 80-85% free water. Calorically dense formulas (1.5 Kcal/ml or greater) contain less, approximately 70-77% free water.

To determine fluid needs for the normal adult or child the following equations may be used.

Adults: 1 ml/per calorie fed

or

25-55 years of age	35 ml/kg body weight/24 hours
56-65 years of age	30 ml/kg body weight /24 hours
>65 years of age	25 ml/kg body weight 24 hours

Children: 1.5 ml/per calorie fed

or

1 year	120-135 ml/kg body weight/24 hours
2 years	115-125 ml/kg body weight/24 hours
4 years	100-110 ml/kg body weight/24 hours
6 years	90-100 ml/kg body weight/24 hours

**ESTIMATED SAFE AND ADEQUATE DAILY DIETARY
INTAKES OF VITAMINS AND MINERALS¹**

Category	Age (year)	Vitamins	
		Biotin (ug)	Pantothenic Acid (mg)
Infants	0-0.5	10	2
	0.5-1	15	3
Children and Adolescents	1-3	20	3
	4-6	25	3-4
	7-10	30	4-5
Adults	11 +	30-100	4-7
		30-100	4-7

Trace Elements ²						
Category	Age (years)	Copper (mg)	Man- ganese (mg)	Fluoride (mg)	Chromium (ug)	Molybdenum (ug)
Infants	0-0.5	0.4-0.6	0.3-0.6	0.1-0.5	10-40	15-30
	0.5-1	0.6-0.7	0.6-1.0	0.2-1.0	20-60	20-40
Children and adolescents	1-3	0.7-1.0	1.0-1.5	0.5-1.5	20-80	25-50
	4-6	1.0-1.5	1.5-2.0	1.0-2.5	30-120	30-75
	7-10	1.0-2.0	2.0-3.0	1.5-2.5	50-200	50-150
Adults	11 +	1.5-2.5	2.0-5.0	1.5-2.5	50-200	75-250
		1.5-3.0	2.0-5.0	1.5-4.0	50-200	75-250

¹Because there is less information on which to base allowances, these figures are not given in the main table of RDA and are provided here in the form of ranges of recommended intakes.

²Since the toxic levels for many trace elements may be only several times usual intake, the upper levels for the trace elements given in this table should not be habitually exceeded.

The RDA's shown in the above Summary Table are expressed in terms of Reference Individuals in different age and sex classes. Since weight is used as the basis for setting RDA's for many nutrients, the figures presented for adults in the Summary Table are the actual medians of the U. S. population of the designated age as reported in the National Health and Nutrition Examination Survey (NHANES II). The median for those under 19 were taken from Hamill et al. (1979). For individuals with substantially different body mass from the Reference Individual, allowances can be adjusted using the median weight appropriate to the observed height.

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES – NATIONAL RESEARCH COUNCIL

RECOMMENDED DIETARY ALLOWANCES¹ Revised 1989*

Designed for the maintenance of good nutrition of practically all healthy peoples in the United States

Category	Age (years) or Condition						<u>Fat-Soluble Vitamins</u>				<u>Water-Soluble Vitamins</u>							<u>Minerals</u>						
		Weight ² (kg)	Weight ² (lb)	Height ² (cm)	Height ² (in)	Protein (g)	Vitamin A (ug R.E.) ³	Vitamin D (ug) ⁴	Vitamin E (mg alpha-T.E.) ⁵	Vitamin K (ug)	Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg N.E.) ⁶	Vitamin B6 (mg)	Folate (ug)	Vitamin B ₁₂ (ug)	Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)	Iodine (ug)	Selenium (ug)
Infants	0.0-0.5	6	13	60	24	13	375	7.5	3	5	30	0.3	0.4	5	0.3	25	0.3	400	300	40	6	5	40	10
	0.5-1.0	9	20	71	28	14	375	10	4	10	35	0.4	0.5	6	0.6	35	0.5	600	500	60	10	5	50	15
Children	1-3	13	29	90	35	16	400	10	6	15	40	0.7	0.8	9	1.0	50	0.7	800	800	80	10	10	70	20
	4-6	20	44	112	44	24	500	10	7	20	45	0.9	1.1	12	1.1	75	1.0	800	800	120	10	10	90	20
	7-10	28	62	132	52	28	700	10	7	30	45	1.0	1.2	13	1.4	100	1.4	800	800	170	10	10	120	30
Males	11-14	45	99	157	62	45	1,000	10	10	45	50	1.3	1.5	17	1.7	150	2.0	1,200	1,200	270	12	15	150	40
	15-18	66	145	176	69	59	1,000	10	10	65	60	1.5	1.8	20	2.0	200	2.0	1,200	1,200	400	12	15	150	50
	19-24	72	160	177	70	58	1,000	10	10	70	60	1.5	1.7	19	2.0	200	2.0	1,200	1,200	350	10	15	150	70
	25-50	79	174	176	70	63	1,000	5	10	80	60	1.5	1.7	19	2.0	200	2.0	800	800	350	10	15	150	70
	51 +	77	170	173	68	63	1,000	5	10	80	60	1.2	1.4	15	2.0	200	2.0	800	800	350	10	15	150	70
Females	11-14	46	101	157	62	46	800	10	8	45	50	1.1	1.3	15	1.4	150	2.0	1,200	1,200	280	15	12	150	45
	15-18	55	120	163	64	44	800	10	8	55	60	1.1	1.3	15	1.5	180	2.0	1,200	1,200	300	15	12	150	50
	19-24	58	128	164	65	46	800	10	8	60	60	1.1	1.3	15	1.6	180	2.0	1,200	1,200	280	15	12	150	55
	25-50	63	138	163	64	50	800	5	8	65	60	1.1	1.3	15	1.6	180	2.0	800	800	280	15	12	150	55
	51 +	65	143	160	63	50	800	5	8	65	60	1.0	1.2	13	1.6	180	2.0	800	800	280	10	12	150	55
Pregnant						60	800	10	10	65	70	1.5	1.6	17	2.2	400	2.2	1,200	1,200	320	30	15	175	65
Lactating	1 st 6 months					65	1,300	10	12	65	95	1.6	1.8	20	2.1	280	2.6	1,200	1,200	355	15	19	200	75
	2 nd 6 months					62	1,200	10	11	65	90	1.6	1.7	20	2.1	260	2.6	1,200	1,200	340	15	16	200	75

¹The allowances, expressed as average daily intakes over time, are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for detailed discussion of allowances and nutrients not tabulated.

²Weights and heights of Reference Adults are actual medians for the U.S. population of the designated age, as reported by NHANES II. The median weights and heights of those under 19 years of age were taken from Hamill et al. (1979) (see pages 16-17.) The use of these figures does not imply that the height-to-weight ratios are ideal.

³Retinol equivalents. 1 retinol equivalent=1ug retinal or 6 ug B-carotene. See text for calculation of vitamin A activity of diets as retinal equivalents.

⁴As cholecalciferol. 10 ug cholecalciferol = 400 I.U. of vitamin D.

⁵Alpha-Tocopherol equivalents. 1 mg d-alpha tocopherol = 1 alpha-T.E. See text for variation in allowances and calculation of vitamin E activity of the diets as alpha-tocopherol equivalents.

⁶1 N.E. (niacin equivalent) is equal to 1 mg of niacin or 60 mg of dietary tryptophan.

*Recommended Dietary Allowances, C. 1989, by the National Academy of Sciences, National Academy Press, Washington D.C.

This page intentionally left blank

Dietary Reference Intake Tables

Dietary Reference Intakes: Elements (page 10.41-10.49)

<http://www.iom.edu/includes/DBFile.asp?id=7294>

Dietary Reference Intakes: Vitamins (page 10.50-10.56)

<http://www.iom.edu/includes/DBFile.asp?id=7296>

Dietary Reference Intakes: Macronutrients (page 10.57-10.61)

<http://www.iom.edu/includes/DBFile.asp?id=7300>

Page 10.62 intentionally left blank

Dietary Guidelines

Dietary Guidelines for Americans, 2000 (page 63)

<http://www.usda.gov/cnpp/DietGd.pdf>